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PHONETICS

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PHONETICS

An Introduction to the Principles of Phonetic Science from the Point of View of English Speech

by

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Preface

The material in this book has been developed with two main purposes in mind: First, it has been our aim to lay here a foundation of phonetic principles on the basis of a sound neuro-physiological background. Second, we have endeavored to make the subject matter of phonetics more teachable than that frequently presented to the student. By *teachable* we mean not only more palatable but also more understandable. In pursuance of this latter aim, we present herein a somewhat "different" approach to the subject—an approach which, we believe, emphasizes a consistent and logical development of the material.

This book is intended primarily as a text for the introductory course in phonetics as offered by departments of speech in colleges and universities. It is hoped that it will fill the need for a textbook in phonetics written from the point of view of the teacher of speech. It provides ample material for a semester's study. It is particularly adapted to this use, since its primary concern is with fundamental principles. It should give to the beginning student the basic background and material necessary for advanced study or for work in the fields of applied phonetics. It is also our hope that the material will find favor in the eyes of those who are out in the field working in situations where daily use is made of phonetic principles. Specifically, the actor, public speaker or reader, the elementary teacher of reading, the college teacher of public speaking, interpretation, or dramatics, the teacher of speech or English in the secondary schools, the speech correction worker, and the teacher of the deaf should find in this book basic material and guiding principles to aid them in the conduct of their work.

In selecting the materials to be included in this book, we have tried to avoid the mere duplication of material already contained in other textbooks of phonetics, the only overlapping with other works in the field being in the foundation material that is common to all introductory works in phonetics. Wherever possible, we have introduced new material or new approaches to old material. At each point where the book touches on material that is treated exhaustively in other texts, we have aimed to present only the general principles involved and to indicate the line of approach, making, at the same time, reference to books that treat the subject in detail. This is especially true of the treatment of the vowels, which ordinarily occupies a large place in textbooks of phonetics. In general, our effort has been to avoid duplicating a mass of material that has already received excellent treatment by other authors and yet to present to our readers a complete and well-balanced treatise.

In the interests of simplicity and teachability, we have made a number of departures from the conventional in material and presentation, but we have endeavored to build upon a scientific foundation and to present the material in a logical manner, so that it can be readily followed and understood by the student.

In the matter of applied phonetics we are fully aware that in each of the several fields of application of phonetic theory an entire book, as large as the present one, could well be written. We have, therefore, covered in special chapters certain of these fields, outlining the rationale of the applications, but leaving to further study and to other texts the practical development of the several fields. We have striven always to keep our book practical, but our conception of the means of accomplishing that end is not to elaborate practical details, but to equip the student with basic information that will be of use to him no matter what field of applied phonetics he may enter.

The subjects of respiration, phonation, and resonance, while undoubtedly of great interest to the phonetician, have been given only cursory treatment, since they seem to belong more properly to the field of voice science. Little has been said concerning local dialects, sectional pronunciations, or foreign sounds, except where such material is useful for illustrative purposes or to round out a point of view presented in the text. It is the belief of the authors that such material is more properly taught in advanced courses after the student has been thoroughly grounded in the fundamental principles of phonetics.

We wish here to call special attention to the two chapters called "The Symbolization of Speech Sounds" and "An Introduction to Phonetics." Both contain important material that is well worth careful consideration. Since some of it may offer difficulties to the student who is just beginning his study of phonetics, we suggest a careful reading of these sections before he begins his consideration of specific speech sounds in Section II, and a restudying of the material after he has made some progress in his understanding of the field.

We wish also to make clear the reasons why certain deviations from the standard symbols of the International Phonetic Alphabet are used in the body of this book. The writers have no quarrel with the International Phonetic Association or its alphabet. This phonetic alphabet is the recognized and standard medium for the symbolization of speech sounds, and its mastery is one of the tasks that the beginning student must undertake. However, certain principles and points of view that the authors believe to be basic are difficult, if not impossible, to present adequately by means of the I.P.A. symbols. We have, then, in order to keep our presentation of these principles clear and consistent, made certain minor changes. It should be clearly understood that these changes are made solely for pedagogical purposes. They are not intended to supplant the International symbols. The phonetician who wishes to communicate his ideas to the profession must use the more universal International Alphabet. We believe that the teacher of phonetics can clarify and systematize his presentation of ideas to the neophyte by making certain changes in symbolization. Having learned the principles involved, it is an easy matter for the beginner to become proficient in the use of the I.P.A. symbols.

One word of caution is necessary. The material in this book is arranged in a definite sequence of ideas. The underlying point of view is, for the most part, carried progressively from chapter to chapter, so that material presented in one portion can be best approached with the perspective given by previous discussions. Although the authors have striven at all times to express their ideas clearly, they do not pretend that the material is always easily assimilated. Consequently, this book does not lend itself readily to skimming, nor can isolated portions be read to the best advantage.

We desire to take this opportunity to thank our many colleagues and former students who have been most liberal with their criticism of the text. We are, likewise, indebted to the College Typing Company of Madison, Wisconsin, for their patience and cooperation in producing the various previous editions of this book, for their work has made it possible for us to put our ideas to that best of all tests—actual classroom use. We are especially anxious to thank Harper and Brothers for their cooperation in bringing to printed form so ambitious a work in phonetics, involving as it does complicated technical problems and expensive manufacturing procedures. This book contains many evidences that the publishers have been willing to break a costly trail that others coming after them may travel more easily. Chief of these evidences is the generous use of specially-cut phonetic types. No previous text has shown as many printed systems of phonograms and diacritics as does this work. We believe the publishers have herein rendered a distinct service, not only to us as authors, but to all scholars in this field. We acknowledge also a special indebtedness to Miss Lousene Rousseau for her painstaking editing of our manuscript.

We wish to thank Dr. Claude M. Wise of Louisiana State University for his scholarly advice in the preparation of the manuscript. It has been a distinct advantage to us to have the benefit of his many years of experience as a teacher in the field of phonetics and as a recognized authority in American dialects. We gladly acknowledge our indebtedness to many friends and co-workers for such merits as this book may possess, but the onus for any errors that may appear must rest on us alone.

ROBERT W. WEST
CLAUDE E. KANTNER

A Word to the Student

In any field of study it is difficult for any writer to present in one text all of the points of view and all of the material pertinent to that field. This is true of the study of phonetics. The field of phonetics is large and includes much material in its own right. It has, in addition, widespread ramifications into other fields. It is also a study that lends itself to different approaches and offers possibilities for varying emphasis as to the type of material presented. This gives rise to dissimilar, if not conflicting, point of view.

It follows that the student who seriously seeks to profit by his study of phonetics will want to read as widely as possible in other works on the subject. With that in mind, the writers have taken the bibliography from its usual obscure spot in the back of the book and placed it in the very first pages in the hope that the student will notice it each time he opens his book, and that it will thus serve as a constant reminder to him of the necessity for much reading in the field.

The following bibliography is selective rather than exhaustive. The books included are recognized works in the field. They represent divergent points of view and deal with varying types of material. There is variety of subject matter sufficient to meet various needs and interests. In order that the student may select his material intelligently, each book is annotated to indicate its general approach and its most worthwhile features.

Bibliography

a. Books

1. Barrows, Sarah T. and Hall, Alta B. *An American Phonetic Reader.* Expression Co. Boston. 1936.

This book provides practice material of various types written in a slightly modified form of the International Phonetic Alphabet. Two main types of speech, the so-called general American and Eastern, are about equally represented.

2. Barrows, Sarah T. and Cordts, Anna D. *The Teacher's Book of Phonetics.* Ginn and Company. Boston. 1926.

This book aims to apply the principles of phonetics to public school teaching. It is practical, rather than theoretical, in nature. The discussions are simple and easily followed. The book contains specific advice for the public school teacher relative to the correction of defective sounds in her pupils. Other chapters deal with the speech mechanism, the sounds of English, the foreign child's speech difficulties, and the phonetic alphabet. The book is well illustrated and contains much practice material.

3. Bender, James F. and Fields, Victor A. *Phonetic Readings in American Speech.* Pitman Publishing Corp. New York. 1939.

This book serves a double purpose in that it provides practice material for drill in the recognition and pronunciation of phonetic symbols and at the same time, contains source material for a study of standards of pronunciation. The authors use the modified International Phonetic Alphabet as presented in the foreword of Webster's *New International Dictionary.* In transcriptions supplied by the authors pronunciation is likewise based upon this dictionary. Drill material consists of nonsense words and phrases, short anecdotes and maxims, and longer readings from American philosophers—all in phonetic transcription. Almost half of the book (25 pages) is given over to sixty-one transcriptions by "American teachers and scholars," mostly in the field of speech and from all over the United States. Each individual was asked to transcribe in the manner in which he would recom-

mend that the passage be spoken. There are also removable pages providing material for written transcription.

4. Bloomfield, Leonard. *Language.* Henry Holt & Company, Inc. New York. 1933.

This is a book in the field of general linguistics. Most of the material is too advanced for the beginning student, and the reading in this book should probably be postponed until the latter part of the course. The material is comprehensive and includes, among other things, a summarized history of the study of languages, a review of the languages of the world, discussions of the phoneme, of syntax, grammatical forms, sentence types, and dialect geography, and a detailed consideration of sound changes. Students in the phonetics course will be especially interested in the chapters on the phoneme, on phonetic structure, and on sound changes. Other portions of the book contain additional interesting and profitable material.

5. Grandgent, C. H. *Old and New.* Harvard University Press. Cambridge. 1920.

A book of delightful essays on various subjects. Students of phonetics will be especially interested in "Fashion and the Broad A," "The Dog's Letter," "Numeric Reform in Nesciobia," and "New England Pronunciation."

6. James, Lloyd A. *Historical Introduction to French Phonetics.* University of London Press. London. 1929.

The primary aim of this book is to trace the development of the sounds of Latin into those of the present French sound system. Approximately half of the book is devoted to a discussion of general phonetic principles and of English speech sounds. The second half traces the Latin influence upon modern French. The beginning student of phonetics will find the first part of the book helpful in his studies.

7. Jespersen, Otto. *Growth and Structure of the English Language.* D. Appleton-Century Company, Inc. New York. 1923.

The purpose of this book is set forth in the first sentence of the first chapter: "It will be my endeavor in this volume to characterize the chief peculiarities of the English language and to explain the growth and significance of those features in its structure which have been of permanent importance." The works of this Danish scholar in the field of linguistics are rightly regarded as "monumental." This particular book is written in a non-technical manner for the general public. Other important books in this field by the same author are: *Language: Its Nature, Development and Origin*, Henry Holt and Co., New York, 1925, and *Phonetic Transcription and Transliteration*, Clarendon Press, Oxford, 1926.

8. Jones, Daniel. *An English Pronouncing Dictionary*. 4th Ed. E. P. Dutton & Co., Inc. New York. 1937.

This book is one of the two English dictionaries that indicate pronunciation solely by the use of phonetic symbols. Word meanings are not given. The introduction states clearly the scope of the book: "The object of the present dictionary is to record with as much accuracy as is necessary for practical linguistic purposes, the pronunciation used by a considerable number of well educated people in the South of England in ordinary conversation. The book is a record of *facts*, not of theories or personal observations. No attempt has been made to decide how people *ought* to pronounce, all the dictionary aims at doing is to give a faithful representation of the manner in which certain people *do* pronounce."

9. Jones, Daniel. *An Outline of English Phonetics*. 4th Ed. E. P. Dutton & Co., Inc. New York. 1934.

This book was written primarily for the foreigner who takes up the study of English. The type of speech represented is standard Southern British, of the style used in careful conversation. Although the book is essentially practical in nature, much attention is given to phonetic principles and experimentation in the field. Speech sounds are treated in detail and the errors most frequently made by foreigners are described, with suggested methods for correction. There are additional discussions of intonation, stress, syllable division, etc. The book is well illustrated.

10. Jones, Daniel. *Phonetic Transcriptions of English Prose*. 2nd Ed. The Clarendon Press. Oxford. 1927.

This book gives sample transcriptions in three styles of pronunciation: (1) that suitable for reciting or reading in public, (2) that used in careful conversation or reading aloud in private, and (3) the style used in rapid conversation. The English prose and the phonetic transcriptions are given on opposite pages, and there are samples of narrow and broad transcription. The transcriptions represent cultured British speech. Students will find this book useful for practice in the reading of phonetic symbols and as an illustration of the characteristics of British speech. See also the author's earlier book, *The Pronunciation of English*, The University Press, Cambridge, 1909.

11. Kenyon, John S. *American Pronunciation.* 6th Ed., Revised. George Wahr, Publisher. Ann Arbor, Michigan. 1935.

In the preface to the first edition, Dr. Kenyon writes, "This book is designed primarily for a textbook on pronunciation." Furthermore, it is concerned chiefly with American pronunciation. The book is descriptive, not prescriptive; it aims to describe pronunciation as it is, rather than to set up "correct" standards. The chapters on phonemes and diaphonemes, syllables, assimilation, stress and gradation are of special interest. Students will likewise be interested in the author's treatment of the [w], [j], [r], and [l] sounds. There are many excellent items concerning the historical development of various sounds. Speech sounds are described in detail both as to their production and use. Phonetic principles are emphasized. This is an excellent book, written from a sound physiological background.

12. Krapp, George Phillip. *The Pronunciation of Standard English in America.* Oxford University Press. New York. 1919.

The preface states, "It is the purpose of this book to provide a rational method of examining pronunciation, the most important of the practical aspects of speech, in order that those who have a conscience in the matter may exercise it with justice both to themselves and to others." Standard speech is defined as " . . . the speech which is least likely to attract attention to itself as being peculiar to any class or locality." The book is divided into three parts. The first describes the speech mechanism, the second discusses specific speech sounds and the third is concerned with the occurrence of these various sounds in the language. There are 60 pages of phonetic transcription at the end of the book. See also the same writer's *The English Language in America*, Century Co., New York, 1925.

13. Mencken, H. L. *The American Language.* 4th Ed. Alfred A. Knopf, Inc. New York. 1937.

This is a very readable book by a vigorous writer on the history and present forms of American speech. Its 700 pages are crammed with

material that covers everything from the earliest forms that began to differentiate American speech from other languages to a chapter of prophecy concerning the future of the American language, including also chapters on such diverse subjects as pronunciation, spelling, proper names, slang, and many other interesting items. Although not a phonetics text in any sense of the word, this book will surely prove interesting to the student, and it will enhance his appreciation and understanding of our American speech.

14. Palmer, Martin, and Blandford. *A Dictionary of English Pronunciation with American Variants.* W. Heffer and Sons. Cambridge. 1926.

This dictionary, prepared by two Americans and an Englishman, shows the pronunciation of some 9,000 common words in the "received" English form, with the typical variations heard among educated Americans noted in a second column. Pronunciation is indicated solely by phonetic symbols. Meanings are not given. The book is interesting, but the American pronunciations given need to be scrutinized carefully. There are 48 pages of introductory material on subjects relating to pronunciation that ought to be read carefully by anyone who intends to make a practical use of the pronunciations given in the body of the dictionary.

15. Ripman, Walter. *Good Speech.* E. P. Dutton & Co., Inc. New York. 1925.

This is an introductory work in English phonetics based on standard British speech. In addition to an elementary description of the sounds of English and their use in connected speech, it contains discussions on the learning of speech by children, the varieties of English speech, the nature of "beautiful" speech and the relationship between speech and spelling. There are specimen transcriptions in the International Phonetic Alphabet. The same author presents a more elaborate discussion of speech sounds in his earlier book, *The Sounds of Spoken English*, E. P. Dutton and Co., New York, 1914.

16. Ripman, Walter. *Elements of Phonetics.* Translated and adapted from Viëtor's *Kleine Phonetik.* E. P. Dutton & Co., Inc. 1926.

This book is a comparative study of the sound systems of English, French, and German, the cultivated speech of London, Paris, and Berlin being accepted as the correct standards for the respective

languages. The book is divided into three main parts. The first describes the organs of speech and their functions, the second treats in detail the sounds of English, French, and German, and the third is concerned with the sounds of these three languages as they occur in connected speech. The symbols used are those of the International Phonetic Alphabet. See also: Viëtor, Wilhelm, *Elements of Phonetics: English, French and German*, E. P. Dutton & Co., Inc., New York, 1926.

17. Russell, G. Oscar. *Speech and Voice*. The Macmillan Company. New York. 1931.

This book contains the results of a comprehensive study of vowel sounds by the X-ray technique and of a laryngo-periskopik study of the vocal cord and interior laryngeal function. It is generously illustrated with charts, diagrams, and pictures, in addition to many cuts of the actual X-ray photographs of the vowel sounds. The author discusses the theories of other writers on many of the items that are taken up in the book. See also an earlier book by the same author, *The Vowel*, Ohio State University Press, Columbus, 1928.

18. Scripture, E. W. *Experimental Phonetics*. Carnegie Institution of Washington. Washington, D. C. 1906.

This is a report of a scientific investigation of speech sounds from the point-of-view of their acoustic effects. Speech was recorded on a gramaphone and then transformed into speech curves by a tracing machine constructed by the author for that purpose. The book describes in detail the recording of speech, the tracing of speech curves, and the analyses to which the material was subjected. It is a highly technical study but interesting to beginning students as illustrative of one of the approaches to the study of speech sounds.

19. Snyder, Joseph F., and Wilke, Walter H. *Effective Pronunciation*. New York University Book Store. New York. 1938.

This planographed book aims to teach effective pronunciation by means of a phonetic analysis of American speech as it is actually spoken. It avoids arbitrary rules and presents the subject of pronunciation from the points of view of usage and the phonetic principles involved. The book presents the phonetic alphabet, provides a test of pronunciation, discusses regional variations in American speech, out-

lines the development of American pronunciation, suggests probable future trends in pronunciation, discusses the problem of "correctness," describes the sounds of speech with drill material for their correction, and discusses the problems of connected speech. The final chapter indicates in phonetic symbols the pronunciation of some 1800 words selected from Thorndike's list of the 20,000 words occurring most frequently in the English language. With a few modifications, the pronunciations are those of Webster's *New International Dictionary*, unabridged.

20. Sweet, Henry. *A Primer of Phonetics*. 3d Ed. Oxford University Press. London. 1906.

This is an introductory book in phonetics written by one of the earlier authorities in the field. The first of its three main parts lays down general phonetic principles and analyzes vowels and consonants on the basis of their position and acoustic effect. It is based upon the consideration of speech sounds in isolation. The second part discusses sounds as they are combined in syllables, words, and sentences. It takes up such matters as quantity, force, glides, syllable division, intonation, voice quality, etc. The third part is a comparative analysis of English, German, French, Latin, and Greek sounds. The book is worth while because it represents an older, but still authoritative, view of phonetics. It is somewhat difficult to follow because the author uses a modification of Bell's system of phonetic notation that is out of date today. This, however, adds some additional interest, and there is much good material in the book for the student who will take the time to study it thoroughly.

21. Sweet, Henry. *The Sounds of English*. The Clarendon Press. Oxford. 1908.

The following quotation from the preface will serve to describe this book: "It differs from my *Primer of Phonetics* . . . to which it will serve as an introduction, not only in being more elementary, more systematically graduated, and more definitely based on the English sound system, but in being better adapted to self-instruction in other respects, as well. I hope it will be found especially useful to those who have to teach phonetics in connection with elocution and modern languages." The author uses an earlier form of the International Phonetic Alphabet.

22. Ward, Ida C. *The Phonetics of English.* D. Appleton-Century Company, Inc. New York. 1929.

The general nature of this book can be best stated in the author's own words in the opening sentences of the preface: "The aim of this book is to present the main facts of English pronunciation of today. The writer has had in mind the teacher who is expected to deal with indistinct or dialectal speech." It is thus a book which stresses the application of phonetic principles to the teaching of good speech. Although the book is written from the standpoint of British speech, the American student will find the descriptions of speech sounds of interest and value. Vowels are described in comparison with the cardinal vowel diagram. There is a chapter on the speech organs and their function.

23. Zipf, George K. *The Psycho-Biology of Language.* Houghton Mifflin Company. Boston. 1935.

This book carries the sub-title, *An Introduction to Dynamic Philology.* In the words of the author, "Dynamic Philology has the ultimate goal of bringing the study of language more into line with the exact sciences. To this end it views speech production as a natural psychological and biological phenomenon to be investigated in the objective spirit of the exact sciences from which its methods have been taken. Our chief method of procedure is the application of statistical principles to the observable phenomena of the stream of speech." This book reports the results, and attempts to interpret the meaning, of certain research of this type. The chapter on "The Form and Behavior of Phonemes" will be most immediately interesting to the student of phonetics. This is not a book that he who runs may read. Most students will want to wait until they have acquired some foundation in the field before reading it.

b. Journals and Pamphlets

1. *American Speech.* A Quarterly of Linguistic Usage. William Cabell Greet, Editor. Columbia University Press, New York.

This journal describing American speech is written for the general public. The articles usually deal with matters of vocabulary, word usage, and pronunciation that are of special interest to the phonetician.

2. *Dialect Notes*. Miles Hanley, Editor. Tuttle, Morehouse, and Taylor. New Haven, Conn.

This publication of the American Dialect Society numbers among its contributors the foremost authorities on phonetics and linguistics in the country. It contains a variety of articles dealing with American speech and particularly with regional dialects.

3. "Guide to Pronunciation." From Webster's *New International Dictionary*. 2nd Ed. Unabridged. G. and C. Merriam Co. Springfield, Mass. 1937.

This section of the dictionary has been rewritten for the latest edition by Dr. Kenyon, the author of *American Pronunciation*. It is a source of compact and authoritative information that is often overlooked by the student of phonetics. It contains, among other things, the key to the symbols used in the dictionary, the alphabet of the I.P.A., and sections on "Standard Pronunciation," "Sounds of Spoken English," "Phonetic Principles," and others. The section on "Phonetic Principles" is especially valuable. It is a compact summary of most of the material usually studied in the phonetics course and merits careful study by every student. The "Guide to Pronunciation" can be secured separately from the publishers.

4. *Language*. The Journal of the Linguistic Society of America. George M. Bolling, Editor. The Linguistic Society of America. Baltimore.

The articles in this journal are usually more within the field of general linguistics than of phonetics. However, it frequently contains material of direct interest to the student of phonetics. See also *Linguistic Monographs* (Waverly Press, Baltimore), a publication of the same Society, containing the reports of extensive research projects.

5. *Le Maître Phonétique*. Edited by Daniel Jones and Paul Passy. Stephen Austin and Sons, Ltd. Hertford, Eng. Quarterly.

This magazine is the official publication of the International Phonetic Association. It is edited by two outstanding phoneticians, Daniel Jones and Paul Passy, who are English and French, respectively. The articles are written entirely in phonetic symbols. The journal is international in scope and each issue contains articles transcribed in various foreign languages. It is thus valuable not only for the intrinsic worth of the articles but also for practice in the reading of phonetic symbols and for studying the sound systems of foreign languages.

6. "The Principles of the International Phonetic Association." Supplement to *Le Maître Phonétique*, Sept.-Oct., 1912. By Daniel Jones and Paul Passy. Obtainable from Daniel Jones, University College, Gower Street, London.

This pamphlet contains, among other items, a brief history of the Association with its aims and constitution, a copy of the International Phonetic Alphabet (as of 1912) with an explanation of the value of the symbols, discussions of narrow and broad transcription and of phonetic spelling, and a short specimen passage transcribed in 22 languages and dialects.

7. *Proceedings of the International Congress of Phonetic Sciences.* 1st: Amsterdam, 1932, "Internationale arbeitsgemeinschaft für phonologie," Amsterdam, 1933. 2nd: London, 1935, Edited by Daniel Jones and D. B. Fry, Cambridge University Press, 1936.

These two publications include the papers and addresses presented at the International Congress of Phonetic Sciences in Amsterdam in 1932 and at a similar Congress in London in 1935. There are papers by leading phoneticians from all over the world. They deal with a great variety of subjects. The *Proceedings* of the London conference is rich in material on the phoneme. The two volumes constitute a valuable source of information in the field of phonetics.

8. *The Quarterly Journal of Speech.* Giles W. Gray, Editor. The Ann Arbor Press. Ann Arbor, Mich.

This magazine is the official publication of the National Association of Teachers of Speech. Almost every issue contains one or more articles of immediate interest to the student of phonetics.

occ.

Stop Plosives (Consonants)[1]

	Printed Symbol	*Script Symbol*	*Key Word*	*Transcription*
1.	[p]	[p]	pay	[pej]
2.	[b]	[b]	bay	[bej]
3.	[t]	[t]	tip	[tɪp]
4.	[d]	[d]	dip	[dɪp]
5.	[k]	[k]	call	[kɔl]
6.	[g]	[g]	gone	[gɔn]

fric

Fricative Continuants (Consonants)

	Printed Symbol	*Script Symbol*	*Key Word*	*Transcription*
1.	[f]	[f]	fat	[fæt]
2.	[v]	[v]	vat	[væt]
3.	[θ]	[θ]	thin	[θɪn]
4.	[ð]	[ð]	then	[ðɛn]
5.	[s]	[s]	sue	[su]
6.	[z]	[z]	zoo	]zu]
7.	[ʃ]	[ʃ]	shoe	[ʃu]
8.	[ʒ]	[ʒ]	vision	[vɪʒən]

Nasal Continuants

	Printed Symbol	*Script Symbol*	*Key Word*	*Transcription*
1.	[m]	[m]	may	[mej]
2.	[n]	[n]	nip	[nɪp]
3.	[ŋ]	[ŋ]	lung	[lʌŋ]

Vowel Continuants

	Printed Symbol	*Script Symbol*	*Key Word*	*Transcription*
1.	[i]	[i]	eat	[it]
2.	[ɪ]	[ɪ]	it	[ɪt]
3.	[e][2]	[e]	vacation	[vẹkejʃən]
4.	[ɛ]	[ɛ]	pen	[pɛn]

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[1] This simplified list of the phonetic symbols used to represent the sounds of English speech is adequate for broad transcription, and is adapted to the needs of beginning students. Symbols for foreign sounds and other symbols indicating refinements in the representation of English are introduced from time to time in the text. For a complete list of all the symbols used in this book, and the modifying signs used in close transcription, see Chapter 12.

[2] In American English, this sound is occasionally produced as a pure vowel in unaccented syllables. In accented syllables, it is a vowel glide.

	Printed Symbol	*Script Symbol*	*Key Word*	*Transcription*
5.	[æ]	[æ]	man	[mæn]
6.	[a]	[a]	ask	[ask] as often pronounced in America. Between [æ] and [ɑ].
7.	[ɑ]	[ɑ]	father	[fɑðɝ̣]
8.	[ɒ]	[ɒ]	sorry	[sɒrɪ̣] as pronounced in England and often in America. Between [ɑ] and [ɔ].
9.	[ɔ]	[ɔ]	all	[ɔl]
10.	[o][3]	[o]	notation	[nọtejʃən]
11.	[ʊ]	[ʊ]	pull	[pʊl]
12.	[u]	[u]	pool	[pul]
13.	[ʌ]	[ʌ]	sun	[sʌn]
14.	[ə]	[ə]	sofa	[sowfə] used only in unstressed syllables.
15.	[ɜ]	[ɜ]	bird	[bɜd] as pronounced in Southern England and parts of Eastern and Southern America. Used only in stressed syllables.
16.	[ɝ]	[ɝ]	bird better	[bɝd] [bɛtɝ̣] as pronounced in the general American dialect.
17.	[ʟ]	[ʟ]	settle	[sɛtʟ̣] vowelized *l*.

Symbols Indicating Glides to or from Certain Vowel Positions

	Printed Symbol	*Script Symbol*	*Key Words*	*Transcription*	*Description*
1.	[w]	[w]	one how	[wʌn] [hɑw]	to or from approximately the position of the vowel [u]

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[3] In American English, this sound is occasionally produced as a pure vowel in unaccented syllables. In accented syllables, it is a vowel glide.

	Printed Symbol	*Script Symbol*	*Key Words*	*Transcription*	*Description*
2.	[j]	[j]	yes day	[jɛs] [dej]	to or from approximately the position of the vowel [i]
3.	[l]	[l]	lay all	[lej] [ɔl]	to or from approximately the position of the vowel [ʟ]
4.	[ə]	[ə]	oh boa	[ˀow][4] [boə]	to or from the positions for the schwa vowel [ə]
5.	[r]	[r]	bar rob	[bɑr] [rɑb]	to or from approximately the position of the vowel [ɝ]

Methods of Initiating or Terminating Certain Speech Sounds

	Printed Symbol	*Script Symbol*	*Key Word*	*Transcription*	*Description*
1.	[h]	[h]	hat	[hæt]	glottal fricative approach or termination
2.	[ʔ]	[ʔ]	up, but (as sometimes heard)	[ʔʌp] [bʌʔ]	glottal explosive approach or glottal implosive termination
3.	[tʃ][5] [dʒ] [st] [zd]	[tʃ] [dʒ] [st] [zd]	church judge step razed	[tʃɝtʃ] [dʒʌdʒ] [stɛp] [rejzd]	oral explosive approach or oral implosive termination

A WORD TO THE STUDENT

These phonetic symbols are the tools with which the student must do his work in the field of phonetics. They are as important to him as the plane, the saw, and the hammer are to the carpenter. Start to learn the symbols at once and keep studying them until they are thoroughly mastered. This task is not as difficult as it appears at first, since the majority of the symbols are taken directly from the written alphabet and many are already properly associated with the sounds for which they stand. Note the symbols [p], [b], [t], [d], [k], [g], [f], [v], [s], [z], [m], [n], [l], [r] and [h]. Obviously, if the reader's production of these sounds is defective or dialectal in any way, they cannot be considered as representative of the sounds intended by the symbols.

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[4] In narrow transcription, as sometimes pronounced.

[5] See also Chapter 10.

Only through usage can the symbols be learned easily and fixed in the mind firmly. The student is urged to do much transcription of his own and other people's speech. Watch for peculiar pronunciations of words and try to record them in phonetic symbols. Practice reading passages written in phonetic symbols. Work of this sort done early in the course will yield rich returns as the study of the subject progresses.

A word of warning should be included concerning the use of key words in determining the sound values of the symbols associated with the words. Obviously, *they are of value only if the student pronounces the words in the way that the writers intended that they should be spoken.* For example, the word *vacation* is used to illustrate the [e] sound. Now, if the reader pronounces the word as [vəkeɪʃən] so that the vowel in the first syllable is like the first vowel in *about*, it is apparent that he will get an entirely wrong impression of the sound value of the symbol [e]. This difficulty is especially likely to arise in connection with vowels and with foreign sounds. This means that in learning the symbols the student should not rely too much on his own pronunciation of the key words, lest he inadvertently associate a given symbol with the wrong sound. The symbols should be learned under someone versed in phonetics. The learning of the non-English sounds should be under the supervision of someone who knows both phonetics and the foreign language represented. Key words are excellent memory devices, but *they do not teach the correct sound for the symbol unless the student already has that sound in his habitual pronunciation.*

The student must grasp the basic concept that in the science of phonetics the symbols are units of measure representing speech sounds. They are used in analyzing and recording speech and in the discussion and recording of the results of observation and research. If they are to be of the greatest service, these units must be kept as standard as possible, that is, they must measure or mean the same thing to different people in different places and at different times. Consequently, the student must make certain that his concept of the sound represented by the symbol coincides with that in general use.

Footnote 1 on page xxvii calls attention to the fact that the symbols given here are for use in broad transcription. Broad transcription means the representation of the sounds that occur in a given portion of speech without any attempt to indicate refinements of pronunciation or subtle differences in sounds. Technically, it is a transcription using one symbol per phoneme—a conception that will be more clear to the student after he has read the discussion on phonemes. Frequently, however, such a gross representation of speech sounds is not satisfactory. Additional symbols and various diacritic markings are needed to indicate delicate shadings of pronunciation. When such symbols are used, we speak of the transcription as "narrow" or "close." In the main, narrow transcription is employed to indicate which of the various members of a sound phoneme was used by a given speaker. As an example, we may say that the representation of *cat* as [kæt] is a broad transcription. However, if we write it as [kæ̃ᵊt], we indicate that a particular speaker nasalized the [æ] sound and spoke the word with an off-glide [ə] between the [æ] and the [t]. The beginning student will use the broad form for his early transcriptions. Special symbols and signs for close transcription are introduced in the text as occasion demands, especially in Section II, which contains detailed discussions of the separate speech sounds. The problems arising in narrow transcription are described and illustrated in some detail in Chapter 12. For the convenience of the student, the complete phonetic alphabet, including signs for close transcription, is given at the end of that chapter. The transcriptions in this book are in the broad form, except when some point of distinction is being illustrated. In such cases, the particular sound or sounds under discussion are usually written in the narrow form while the rest of the word or sentence is represented in broad transcription.

The authors assume no responsibility for writing a prescriptive text laying down rules for correct pronunciation. Nevertheless, the writer of a textbook in phonetics is faced with the necessity of deciding what pronunciation to indicate when transcribing his illustrative material. In this book, many of the illustrations exemplify special forms of pronunciation or dialectal speech. When such is not the case, the transcriptions are based on the pronunciation given in Webster's unabridged *New International Dictionary*, 2nd Ed., 1937. In instances in which the dictionary does not indicate clearly the pronunciation, because of sectional variations, the so-called general American dialect[6] is followed. Needless to say, this is in no way a claim to superiority on the part of the general American speech. The writers feel that, in order to avoid confusion, a textbook of phonetics should adhere rather closely to one of the major American dialects. They have chosen the general American, partly because they are best acquainted with it, and partly because they feel that it will be the most serviceable to the majority of their readers. Neither is it to be assumed that the words and phrases given in phonetic transcription are intended as guides to the "proper" pronunciation. They are intended only as illustrations, not examples to be followed. In fact, many instances can be found in which the same word is given variant pronunciations. Unless otherwise indicated, the writers have endeavored to transcribe their illustrations in what they consider to be good general American speech but they are in no way interested in setting up standards of pronunciation, either general American or otherwise.

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[6] See Chapter 16.

SECTION ONE

AN INTRODUCTION TO THE
STUDY OF PHONETICS

Chapter 1

The Symbolization of Speech Sounds

1. DEFINITION

In a sense, phonetics may justly be called a study of symbols. This process we call speech is essentially a system of symbolization that has been built up to make negotiable from one individual to another his concept of certain objects, qualities, acts, ideas, or relationships. Speech uses as its medium of transmission sound waves that are set up in various parts of the speech mechanism. This mechanism is capable of producing a large number of sounds that are within the auditory range. A relatively small number of these sounds become stereotyped in their production and serve, by the common consent of those speaking the language, as units in the formation of the acoustic symbols we call words. These units we may properly call speech sounds.

The sounds represented by the symbols [k], [æ], and [t], for example, are produced by the speech mechanism, received by the auditory mechanism, stereotyped in their production, and used as units in the formation of auditory symbols, i.e., words. Thus they qualify as speech sounds. This particular combination of speech sounds serves, when it impinges upon the auditory mechanism of some one using the same set of symbols, to call forth an image of a small, furry animal with a long tail. We may further qualify our definition of a speech sound by saying that it ought to be a single sound, that is, a sound that, in terms of the fundamental movements involved in its production, is incapable of further division.

Ordinarily speech sounds do not carry meaning when used alone. They are to be regarded as units that are combined with each other to form the words we use in speech as auditory symbols. However, some speech sounds do have meaning when used individually. Among these we may note [ʃ] meaning "be quiet," [s] expressing disapproval, [mː] indicating uncertainty, [ɑj] the personal pronoun and [æ], [ɑ], [ɔ] and

[ow] which, when spoken with the proper inflection, indicate various emotional attitudes such as disgust, fear, disapproval, surprise and disbelief.

Out of all the sounds that can be produced by the speech mechanism, only a few are used in the formation of the auditory symbols that constitute speech. Naturally, in the development of different languages somewhat different sounds will be selected for this purpose, different combinations of these sounds may be used, or the same combinations may become symbols representing different meanings.

For those who like categorical definitions, the writers present the following: On the perceptual side, a speech sound is a time order of acoustic events so stereotyped in its symbolic semantic uses that any significant portion of it will engender a perception of the whole. From the standpoint of production, a speech sound is a sound within the auditory range, produced by the speech mechanism, stereotyped in its production so that it is usually produced in approximately the same manner and used as a unit in the formation of symbols which have come by association to be connected with certain objects, qualities, acts, ideas or relationships in such a manner that these symbols convey meaning when they impinge upon the auditory mechanism of anyone using the same set of symbols. From the standpoint of physics, a speech sound is a series of physical vibrations produced by the speech mechanism, lying within the auditory range and having symbolic significance in the process of communication.

Thus we may say that our spoken language is in reality a series of auditory symbols that can be further broken up into symbol units or speech sounds. These symbol units are composed of physical vibrations in the atmosphere known as sound waves. The producing mechanism is that part of the body known as the speech mechanism. The receiving mechanism is the auditory mechanism, using this term in a broad sense to include not only the ear, but also the higher auditory centers in the brain.

2. THE RELATIONSHIP OF THE WRITTEN ALPHABET TO SPEECH

So far as we know, spoken language has always preceded writing. Except in pictographic or ideographic languages, the written alphabet, as it develops, is an attempt to symbolize visually speech sounds that have already been in the language for a long time. This is certainly true of the alphabet that we use to write the English language. In the sixth century the progenitor of our English language had no alphabet. There existed only the very cumbersome runic writing which was a religious form. It was at this time that the Christian missionaries began to use the characters of the Latin alphabet to represent the native speech sounds. Thus, in the forerunner of our English alphabet, each character stood more or less accurately for a given sound according to the phonetic knowledge of the missionaries.

The written alphabet is then, in reality, a series of visual symbols which stand for corresponding auditory symbols, which, in turn, symbolize objects, ideas, or relationships. It is, incidentally, a matter of dispute as to whether these visual symbols, i.e., letters of the alphabet as they are combined into words, sentences, etc., can ever stand directly for ideas, or whether they must always be first translated into auditory symbols, i.e., speech sounds, and thence to ideas. Be that as it may, the fact remains that in the learning of speech by the race and by the child the auditory symbols are learned first and the visual symbols later. It is interesting to note, in passing, that in our earlier elementary education, reading was taught by teaching first the sound value of each individual letter, then combining these sounds or letters into a word and then, by means of a picture or some other method, attaching meaning to the word. Modern methods of teaching rapid silent reading attempt to go directly from the visual symbols, i.e., letters and words, to the ideas represented without the intervening step of translating into sounds.

3. PHONETIC ALPHABETS

We have mentioned previously that when the Roman alphabet was first used to represent English speech sounds, each character in the alphabet stood for a sound, and each sound in the language at that time, supposedly, had a character to represent it. Such an alphabet is called a phonetic alphabet and the characters of which it is composed are phonetic symbols. This representation of sounds by the Roman alphabet was probably very inaccurate even at the beginning and it has grown increasingly so with the passage of time. At the present time any student of speech knows that the letters on a page of writing fall far short of representing the sounds. This means that the auditory symbol units or speech sounds have changed at a vastly more rapid pace than the visual symbols. The reason for this is twofold. In the first place, the mechanism that produces the auditory symbols (the speech mechanism) is much more subject to variation than the mechanism that produces the visual symbols (the hand and arm). Thus, the speech sounds as they are produced from individual to individual, year to year, and generation to generation, vary more *in their production* than do the corresponding letters of the alphabet. The reason for this is partly a physiological one, having its basis in the less stable voluntary control of the speech mechanism. It is also partly a matter of the permanence of the two types of symbols, which in turn is really a matter of the durability of the media in which the two types of symbols are perpetuated. It is evident that the auditory symbols, that is to say, the sound waves themselves, have no permanency. They are gone the instant they are produced and, up to the invention of recording apparatus, could be retained only in memory. The visual symbols, on the other hand, are as permanent as the materials out of which and on which they are recorded. This largely explains why the spoken language has changed so radically since the sixth century that we would be unable to understand the language of that time if we heard it; whereas the alphabet used to record that language, even though changed in many respects, is still essentially the same.

4. The Necessity for Using Phonetic Symbols in the Study of Phonetics

The above discussion enables us to understand why the study of phonetics begins with either the construction of a phonetic alphabet or the learning of one previously constructed by others. Perhaps, however, the student who is shortly to be faced with the task of learning these symbols and of using them in transcription is not yet convinced of their necessity. A single illustration should suffice to emphasize their value. Note the sounds represented by the letter *a* in the following words: *Aaron*, *at*, *ably*, *above*, *alms*, and *awe*. Note also the spellings of the sound [i] in the words l*i*ter, b*ea*t, Ph*oe*nix, p*eo*ple, d*ee*p, k*ey*, qu*ay* and bel*ie*f. The consonant [ʃ] also has various spellings in the words pa*ss*ion, *sh*ip, an*x*ious, o*c*ean, auc*t*ion, *ch*agrin, *s*ugar, con*sc*ious and *sch*ist. Now try to write out some instructions on the pronunciation of these sounds for the benefit of some real or imaginary foreign friend who does not understand our English sound system. It is evident that this would be about as difficult as trying to introduce a large number of people to each other without knowing their names. True, one could point at them, or describe their appearance, or compare them with someone else whose name he did know, but the process would be clumsy, time-consuming, and inaccurate. It is difficult to think, talk, or write about speech sounds without some symbol or name that will stand for each one. As a matter of fact, it is practically impossible to record observations made in the field of phonetics in such a way that the reader can understand them without resorting to phonetic symbols.

The question naturally arises as to why one cannot use the system already developed for use in the dictionaries and thus avoid the necessity of learning a new set of symbols. We need not consider the implied assumption that the dictionary markings have been learned, and the fact that different publishers of dictionaries use many somewhat different systems. The question partially answers itself if we consider the exact nature of the dictionary symbols. They are basically an attempt to represent speech sounds within the framework of a written alphabet which is essentially unphonetic. Since the letters of the alphabet are not sufficient in themselves, they are supplemented by certain arbitrary signs called diacritical markings.[1] In this connection, we should recall that the minimum number of symbols needed in our phonetic alphabet for purposes of broad transcription of American speech is 42, whereas there are but 26 letters in the written alphabet. Additional confusion arises from the fact that the so-called vowels of the written alphabet (*a*, *e*, *i*, *o*, *u*, and sometimes *y* and *w*) are pronounced in from three to eight different ways and that most of the consonants have more than one pronounciation. Consequently, we find Webster listing eight diacritical markings for *a* as follows: ā̇, ă, ȧ, ä, ā, â, *ă*, and *ȧ*. It is doubtful if the average reader will be able to recall offhand the sound values of all of these markings. Webster's newest unabridged dictionary uses, altogether, 66 symbols, without making any finer distinctions between sounds than can be made with the 42 symbols of the phonetic alphabet presented in the early pages of this book. Obviously, there must be considerable overlapping among the dictionary markings. These markings serve their purpose in the dictionaries reasonably well, because they are always accompanied by key words. However, they are ill-adapted to the classroom, the laboratory, and the professional journal since they are unnecessarily complicated, difficult to remember and confusing in use.

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[1] For a more complete discussion of diacritical markings and an exposition of the systems used by three standard dictionaries, see Chapter 19.

5. Problems in the Construction of a Phonetic Alphabet

We have previously defined a phonetic alphabet as one in which there is a symbol for each sound in the language. Putting it another way, each sound is always represented by one and the same symbol. In contrast to the dictionary system, a phonetic alphabet uses diacritical markings only as *modifying signs* to indicate nuances of pronunciation. They are not needed to differentiate the basic sounds, or phonemes, as we shall later call them, of a language.

Since English was once a partially phonetic language, the process of constructing a phonetic alphabet is essentially a process of revising our present written alphabet so that there will be separate characters to represent each sound. A number of phonetic systems have been devised from time to time, some of which have been discarded for various reasons. While these are outside the scope of this discussion, the student will find it interesting to investigate some of these older phonetic alphabets in books dealing with the history of the subject.[2]

The devising of a set of symbols to represent the sounds used in speech is by no means simple. Without going into detail, we may enumerate three of the major difficulties involved: (1) the problem of finding what sounds are present in a given language, avoiding both unnecessarily fine distinctions and gross overlapping; (2) the problem of finding symbols to represent these sounds that will be readily comprehensible and easily available in type, and (3) the problem of devising a system that will be neither too elaborate for practical use nor too abbreviated for accurate speech representation. Except for the matter of the availability of the symbols on typewriters and in standard print, these problems have been largely solved for us by phoneticians. The problem of finding additional symbols is worthy of special mention, since an understanding of the origin or form of these new symbols will often aid in learning them more rapidly.

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[2] See A. G. Bell, *The Mechanism of Speech*, Funk and Wagnalls (New York, 1908) and Henry Sweet, *A Primer of Phonetics*. 2nd Ed., Rev., The Clarendon Press (Oxford, England, 1902). Chapter 18 also contains some related material.

We have already listed fifteen symbols taken from the written alphabet that have the same sound value customarily given them in English. Five vowels and one glide sound are represented by regular printed letters in the alphabet [i, e, a, o, u and j] which have been assigned arbitrary, yet logical values. Three more symbols, [ɪ, ʊ, and ʟ] are derived from small forms of the capital letters. [ɑ] is a written *a* and [ɒ] is the same symbol upside down. [ɛ] is a modified form of the Greek letter epsilon; [ɜ] is a reversed epsilon and [ɝ] is a reversed epsilon with a curl at the top. [ɔ] is an open *o*, [ʌ] is an upside down *v*, [ə] is an inverted *e* and [æ] is formed by combining lower case *a* and *e*. Of the remaining consonant symbols that are unfamiliar, [θ] is the Greek letter theta; [ð] is an old English form of *th;* [ʃ] and [ʒ] are elongated forms of *s* and *z;* [ŋ] is an *n* with a tail, and [ʔ] is a question mark without the dot.

6. THE INTERNATIONAL PHONETIC ALPHABET

It is not surprising that every set of symbols yet devised has had its imperfections. The most satisfactory and widely used system at the present time is the International Phonetic Alphabet (I. P. A.) as developed by the International Phonetic Association. As indicated by its name, this alphabet includes symbols not only for English sounds, but also for all modern European languages, as well as for some others. That even the I. P. A. has its imperfections is shown by the fact that practically every writer in the field of English phonetics has seen fit to make some changes in it to meet the needs of his presentation. It is, however, the one common vehicle for the exchange of ideas in the phonetic world. It is more widely used than any other set of symbols, with the exception of the diacritic markings used in the dictionaries.

For these reasons, the student of phonetics must learn, and be able to use, the I. P. A. symbols.

Mention should also be made here of the alphabet used by the American Dialect Society in recording and preserving speech in local communities throughout the United States for the Dialect Atlas Survey. This alphabet is basically the same as the I. P. A. A few changes have been made, and a number of new symbols and modifying signs have been added in order to meet the need for a very narrow form of transcription in recording the niceties of dialect speech.

7. The Phonetic Alphabet Used in This Book

The alphabet presented in the front of this book is essentially that of the International Phonetic Association. It contains the symbols necessary for a broad transcription of English speech. The writers have introduced and used in the body of this text a few changes from the conventional representation of I. P. A. It is our conviction that changes in the International Phonetic Alphabet should not be made at random, or, indeed, at all, unless they are definitely warranted. We feel, however, that the changes here introduced are justified in the interests of teachability in that they make the material easier to assimilate and retain. The changes have been made because the writers' understanding and interpretation of the phonetic principles involved lead them to believe that either a new symbol or the attaching of a new significance to an old symbol is needed.

The International Phonetic Alphabet is discussed in detail in Chapter 18, and the changes used in this book are listed and illustrated by sample transcriptions. The beginning student will do best to delay consideration of this chapter until it is reached in the normal progress of the course. The reader who has a previous acquaintance with phonetics may wish to peruse this material in advance in order to avoid confusion as he reads further into the book.

8. Sample Transcriptions in Type and Script

The following transcriptions (type and script in alternate lines) illustrate a broad transcription of English speech in the General American dialect. A rather slow and careful manner of utterance is assumed. The symbols are those used in this book.

The dot appearing under a vowel is to be interpreted as follows: The vowel [ɪ̣] thus marked, occupies a relatively unstressed position and is, itself, partially unstressed. It has not unstressed completely to become [ə]: rather it still partakes of the quality of the vowel indicated, even though it obviously lacks something of its full value. The dot would never be used in a syllable with primary accent. It indicates a degree of unstressing that is to be found only in relatively unaccented syllables or parts of a phrase. Thus, the first vowel in *approach* would be written as [æ] if the transcriber wished to indicate its pronunciation with approximately the same full vowel value (though not necessarily the same length) that would be given if the syllable were stressed. [ə], on the other hand, would mean that the vowel had entirely lost its identity and unstressed completely, into a new phoneme. [æ̣], then indicates a partial unstressing somewhere between [æ] and [ə] but near enough to [æ] that it is recognized as deriving from that phoneme. [æprowtʃ], [æ̣prowtʃ] and [əprowtʃ] indicate varying degrees of stress on the vowel in the syllable under discussion. The use of the dot is to be considered as a broad transcription device. This matter is discussed in greater detail in conjunction with the schwa vowels in Chapter 5.

The transcription follows:

ðə lɔrd ɪz mɑj ʃɛpɝ̣d ɑj ʃæl nɑt wɑnt
ðə lɔrd ɪz maj ʃɛpɝ̣d aj ʃæl nat want
hi mejkɪ̣θ mi tụ lɑ̇j dɑwn ɪn grin pæstʃɝ̣z
hi mejkɪ̣θ mi tụ laj dawn ɪn grin pæstʃɝ̣z
hi lidɪ̣θ mi bɪ̣sɑjd ðə stɪl wɑtɝ̣z
hi lidɪ̣θ mi bɪ̣sajd ðə stɪl watɝ̣z
hi rɪ̣stowrɪ̣θ mɑj sowl
hi rɪ̣stowrɪ̣θ maj sowl
hi lidɪ̣θ mi ɪn ðə pæðz əv rɑjtʃəsnɪ̣s
hi lidɪ̣θ mi ɪn ðə pæðz əv rajtʃəsnɪ̣s
fɔr hɪz nejmz sejk
fɔr hɪz nejmz sejk

jej ðow aj wɔk θru ðə vælị əv ðə ʃædọw əv dɛθ
jej ðow aj wɔk θru ðə vælɪ̣· əv ðə ʃædọw əvdɛθ

aj wɪl fɪr now ivəl fɔr ðaw art wɪθ mi
aj wɪl fɪr now ivəl fɔr ðaw art wɪθ mi

ðaj rad ænd ðaj stæf ðej kʌmfɜt mi
ðaj rad ænd ðaj stæf ðej kʌmfɜ̣t mi

ðaw prịpɛrịst ə tejbəl bịfowr mi ɪn ðə prɛzn̩ts
ðaw prɪ̣pɛrɪ̣st ə tejbəl bɪ̣fowr mi ɪn ðə prɛzn̩ts

əv majn ɛnịmɪz
əv majn ɛnɪ̣mɪ̣z

ðaw ənɔjntɪst maj hɛd wɪð ɔj̈l
ðaw ənɔjntɪ̣st maj hɛd wɪð ɔjl

maj kʌp rʌnịθ· owvɜ̣
maj kʌp rʌnɪ̣θ owvɜ̣

ʃurlị gudnịs ænd mɜsị ʃæl falow mi ɔl ðə dejz
ʃurlɪ̣ gudnɪ̣s ænd mɜsɪ̣ ʃæl falow mi ɔl ðə dejz

əv maj lajf
əv maj lajf

ænd ai wɪl dwɛl ɪn ðə haws əv ðə lɔrd fɔrɛvɜ
ænd aj wɪl dwɛl ɪn ðə haws əv ðə lɔrd fɔrɛvɜ̣

Chapter 2

Basic Principles in the Study of Phonetics

1. THE PURPOSE OF THIS SECTION

It is our aim in this chapter to introduce the reader to the science of phonetics. In addition to defining the field of phonetics and its spheres of usefulness, we hope to lay down some basic considerations to be kept in mind in the study of this subject, to enumerate with brief comments various approaches to the study, and to discuss with some detail one such approach. This chapter will also include a discussion of the various problems connected with the study of phonetics.

This material should serve to illustrate the connections between phonetics and other branches of speech study, particularly speech science. It should also prepare the student for a further study of the subject by giving him a general background in the field.

2. A DEFINITION OF PHONETICS

Broadly speaking, phonetics is the study of speech sounds. Such a study includes the consideration of the symbolic nature of speech sounds, the way in which speech sounds are produced by the speech mechanism, the physical and psychological problems connected with the perception of these sounds by the auditory mechanism, and, lastly, the varying usage and variant pronunciation of these sounds in different parts of a given country or of the world. Usually, the study involves the devising and use of a set of symbols to represent these sounds.

Care must be taken to distinguish between phonetics proper and applied phonetics. As indicated above, phonetics proper is the scientific study of speech sounds from the standpoints of their production, reception, and symbolic use. Phonetics as a study has broad applications, but it is not accurate to call these applications phonetics. Thus, the use of phonetics in the correction of defective speech or in the teaching of a standard speech is not to be considered as a study of phonetics proper, but, rather, as applied phonetics.

3. Some Applications of Phonetic Science

As indicated above, phonetic principles may have many applications. We may list these briefly as follows: (1) their application to studies in other branches of general linguistics, i.e., morphology, etymology, dialect studies, etc.; (2) their application in the field of speech correction; (3) their application in speech science, speech psychology, and other informational speech courses; (4) application in such practice speech courses as interpretation, voice training, general speech, etc.; (5) application in dramatics, i.e., the teaching of stage speech or of a given dialect for use in a play; and (6) general application to the teaching of pronunciation by means of dictionaries, workbooks, etc.

4. Allied Fields

It is obvious that the study of phonetics draws heavily upon other related fields. Anatomy, neurology and physiology contribute material on the structure and functioning of the speech mechanism. Information covering the nature of sound in general and of speech sounds in particular is drawn from the field of physics, while psychology helps us to understand the symbolic nature of speech sounds. Needless to say, phonetics is also closely related to other phases of speech study, especially speech science. Dialect studies and foreign language studies, together with studies of sound changes, bring in also such related fields as geography, history, and sociology. Phonetics is a branch of general linguistics and is thus related to studies in etymology, morphology, and orthoepy.

The technical study of phonetics in the laboratory also requires a wide range of technical skill in, and knowledge of, different fields. Such projects as the phonographic recording of speech sounds, the making of x-ray pictures of the mechanism in action, the making of palatograms, etc. are examples of the type of work done in the phonetics laboratory.

5. Some Basic Considerations in the Study of Phonetics

With this general introduction, we may proceed now to lay down several general principles that are basic considerations in the study of phonetics. This is not an attempt to summarize the whole field of phonetics nor yet all of its important phases. It is an attempt to formulate and state some broad general principles that will serve as foundation stones, or, perhaps better still, as points of departure, for students undertaking a study of phonetics. There are six such principles to be enumerated. Lack of space forbids a lengthy discussion of each one, but the broad applications of each are indicated. It will be noted that some of the statements are broad enough to apply to other phases of speech study while others have ramifications into the fields of applied phonetics. The six basic considerations follow:

(1). *Speech Sounds are Produced by Portions of the Vegetative System.* This statement indicates that the study of phonetics will be concerned in one of its aspects with contracting and conducting tissues—muscles and nerves. It will involve a neurological and anatomical study of the various structures that make up the speech mechanism and of the action of these structures in the production of speech sounds. It means also that the nature of the sounds produced will be restricted and governed by the laws and limitations governing muscle movement and the conduction of nerve impulses. Also involved are the implications of the fact that the structures that produce these sounds have other vital functions, which take precedence over speech.[1]

(2). *Speech Sounds Are Received by the Auditory Mechanism.* These speech sounds so produced are received and interpreted by the auditory mechanism together with its associated higher centers in the brain. This implies the consideration of speech sounds as acoustic phenomena and involves such problems as the following: the physics of sound in general; the anatomy and functioning of the auditory mechanism, its limitations and possibilities; auditory range, carrying power, ability to distinguish between sounds, pitch, volume, resonance, and pressure patterns; and, lastly, the effect of hearing on sound changes, the learning of speech sounds, and the development of speech defects.

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[1] See Chapter 3 for a more complete discussion of this statement.

(3). *Speech Sounds Are Symbol Units.* These speech sounds become stereotyped and serve as units in the formation of symbols that, by usage and common consent of those using the symbols, become associated with certain objects, qualities, acts, ideas, and relationships. This statement has been discussed elsewhere and needs no further elaboration here.

(4). *Speech Sounds Are Learned.* Speech is an acquired and not an inherited trait, and each child learns anew the auditory symbols used by those about him. Moreover, the ability to develop and use any very complicated set of symbols seems to be limited to the human race. This statement, once the subject of dispute, but now a truism, has an important application to any phase of speech that has to do with the acquiring of speech habits or the re-education of those habits, as, for example, the learning of speech by children, the teaching of foreign language and the correction of dialects.

(5). *Speech Sounds Are Influenced by Forces That Work to Produce Variation.* There are forces in operation that work to produce a great deal of variation in the way in which any given speech sound is produced and, to a lesser extent, in its acoustic effect. This variation occurs in the speech of any one individual when he makes a certain sound at different times. It occurs, also, in different individuals subject, apparently, to the same environment. It occurs in different sections of a country or in different countries where the same language is spoken with varying dialects. The forces that act to produce this variation may be enumerated as follows: the inability of the neuromuscular mechanism to repeat a movement after an absolutely exact pattern; the influence of the position of the body as a whole upon the functioning of the speech mechanism and on the production of the sounds; the variation in structure from one individual to another; the influence of neighboring sounds; and the tendency of an individual to produce a sound as he hears it. This last point, which is very important, means that, in the absence of training, speech sounds will vary according to the variation in hearing and that this variation will grow more pronounced in districts lacking widespread intercommunication. Obviously, all this has an important bearing on the way in which speech sounds are produced, on the origins of dialects, and on the studies of such dialects.

(6). *Speech Sounds Are Influenced by Forces That Work to Prevent Variation.* There are also in operation forces that work to prevent change and to keep speech in general, and speech sounds in particular, static.

If it were not for these forces working to check change, it is possible that only those who lived in close proximity would be able to communicate with each other, and that speech in isolated districts would become unrecognizable to non-residents at a much faster rate than it does at present. One of these stabilizing forces is the physiological tendency of the organism to follow the line of least resistance—in other words, to form habits whereby movements or acts are repeated time after time in a similar, if not exactly identical, fashion. This is essentially a matter of laying down neural patterns or *neurograms* in the nervous system for the production of each sound. These patterns become more stereotyped with each repetition, and as they become more stereotyped they become more difficult to change. The similarity of movement is not absolute, but there are definite limits to the probable variation.

Furthermore, while speech mechanisms and auditory mechanisms differ in different individuals, they are alike in their broader aspects. Thus, given mechanisms with no actual pathologies, the variations in a sound that occur as the result of differences in structure are usually minor, and they do not affect greatly the fundamental nature of the sound.

A third force operating to check change has its basis in the perceptual side of the problem. Since these sound units combine to form symbols that serve to stir up meanings, it follows that they lose their value if they are no longer recognized by the listener as the sound that the speaker intended to use. In other words, the amount of variation in the production of any given speech sound, if that sound is to remain serviceable, is limited by the ability of those who hear the sound to recognize it as the symbol that the speaker thought he was using. Thus, other factors remaining equal, the greater the intercommunication among the residents in a given geographical area, the stronger will be the forces working toward stabilization of the language.

6. THE PHONEME THEORY[2]

The two sets of forces discussed above, the one working to produce change and the other resisting change, form the basis for a discussion of the phoneme theory. Perhaps the term "sound family" is the most adequate simple interpretation of the term *phoneme;* it implies a group of sounds that are closely related to each other in some way, and yet are by no means identical. Let us take the usual sound of the letter *t*, symbol [t], for an example. We have stated that it is theoretically impossible for anyone to make two *t* sounds *exactly* alike. Even for practical purposes, the *t* may vary greatly as it is pronounced by one individual in different combinations or by different individuals. It is well known that a *t* can be produced with the tongue tip placed anywhere from behind the lower front teeth, to the edges of the upper front teeth, and as far back on the hard palate as the tongue can reach by curling upwards and backwards. On the other hand, these variations are limited, first, by the physiological tendency of the mechanism to stereotype the movements, and, second, by the fact that the resulting sound must still be recognized acoustically as a *t* or it loses its symbolic value. But within these limits, there is considerable variation. The symbol [t], then, obviously does not stand for a single distinct sound which is an entity in itself. It is, rather, a general symbol standing for any one of a series of *t* sounds. Such a family of sounds is called a phoneme. The phoneme theory is simply an attempt to take account of the variation in the production of any given speech sound and to place limits on that variation. These limits of variation are governed, as noted previously, by the recognizability of the sound, in this case as a *t*. If those who hear the sound perceive it as a *t*, then it is within the *t* phoneme; if not, then it belongs to some other phoneme, or to no phoneme at all.

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[2] The beginning student may wish to supplement this discussion by readings in Ward, *The Phonetics of English*, pp. 60–64; James, *Historical Introduction to Phonetics*, Ch. 3, and Kenyon, *American Pronunciation*, Introduction. Those who wish to study the phoneme in more detail should consult the following sources, in the order given. (1) Bloomfield, *Language*, Chapts. 5 and 6; (2) Swadesh, M. "The Phonemic Principle," *Language*, June, 1934; (3) Twadell, "On Defining the Phoneme," *Language Monographs*, March, 1935; (4) Andrade, M. J., "Some Questions of Fact and Policy Concerning Phonemes," *Language*, January-March, 1936; (5) *Proceedings of the Second International Phonetic Congress of Phonetic Sciences*, Cambridge University Press, 1935 (Contains numerous addresses dealing with the phoneme).

It is not to be supposed, however, that in listening to speech we consciously analyze the continuous flow of language into its separate symbol units and make mental note of the phonemes used. The process of breaking speech down into phonemes is highly artificial, so far as the layman is concerned. We can say that the layman recognizes at least two types of variations in speech sounds. First, he may recognize that the sounds used by another individual are defective or distorted—that they differ somewhat from the ones he uses. He notes the distortions, but recognizes the sounds as his own; that is, they fall within his own phonemes. In the second place, the layman may note that the sounds used by another individual are quite different from the ones he uses in the same combinations. They are not merely distortions of his own sounds; they are different sounds. They may be sounds with which he is familiar in other combinations, or they may be sounds that are quite foreign to him, but they are not the ones he, himself, would have used. They lie in different phonemes.

We should note here that a change of phonemes does not necessarily cause a misinterpretation of the meaning. The Southerner who pronounces *bird* as [bɜːd] may understand perfectly well the Middle Westener who says [bɝd], and yet realize that a quite different sound, i.e., phoneme, has been used. Similarly, a Middle Westener who pronounces *penny* as [pɛnɪ̣] may understand the Southerner who says [pɪnɪ̣], but again be aware of a difference that goes beyond mere distortion. Thus, even the layman who probably has never heard the word *phoneme*, may be aware of phonemic changes without losing the meaning of what is said. On the other hand, phonemic changes do frequently result in misinterpretation of meaning. For example, one Middle Western farmer who is accustomed to saying, "My father is in the barn" [mɑj fɑðɚ̣ ɪz ɪn ðə bɑrn] might misunderstand completely another Middle Western farmer of German extraction who said [mɑj fɑd̪ɚ̣ ɪz ɪn d̪ə bɑrn].[3]

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[3] For explanation of the modifier ̪ see page 200.

It will be recognized that we have discussed the phoneme as a psychological phenomenon having to do with the recognition of variations in the production of speech. The degrees of awareness of variation and their relation to the phoneme concept may be classified as follows: (1) If the listener is unaware of any difference in the speech of a second person, then, *for him*, his own phonemes have been used. (2) If the listener is aware of a difference, but thinks of the sound as a distorted or defective utterance of the same one he would have used, then it is still within his own phoneme. (3) If, on the other hand, the listener observes that the speaker has used a quite different sound, then, even though he may still understand the meaning, a different phoneme has been used. (4) Again, if the listener misunderstands the meaning because of a difference in the sounds used, we may also say that, so far as the listener is concerned, the speaker has employed another phoneme. We have previously illustrated differences in pronunciation that may seem to the listener to involve different phonemes. As an example of a distortion not felt to be in a different phoneme, note the difference between the pronunciation of *cat* in an ordinary fashion as [kæt] and than definitely nasalized, as [kæ̃t].[4] Similarly, a listener whose own *s* is produced normally might be aware of distortion in a speaker whose *s* is "spread" because of wide spaces between the upper front teeth, but still recognize it as an *s* sound. If, however, the spread *s* was so distorted that the listener misunderstood and heard [ʃɪp] when the speaker meant [sɪp], then the *s* of the speaker is outside the listener's own *s* phoneme, and falls rather within his *sh* phoneme.

From all this, it may be readily adduced that individuals will vary greatly in their awareness of phonemic changes. Thus, a linguist, a phonetician and a layman, all speaking the same language, might think in terms of quite different sets of phonemes and vary widely in their capacity to note phonetic changes. To illustrate, suppose that three individuals from different sections of the country are conversing, and A speaks of the [pæθ], B of the [paθ] and C of the [pɑθ]. A might note that two different phonemes had been used, his own [æ] and C's [ɑ]. He might not note any difference at all in B's sound or he might think of it as a variant of his own [æ]. C, on the other hand, would probably notice that A had used a different sound, but might think that B had merely distorted the [ɑ] sound. B, however, might conceivably recognize both [æ] and [ɑ] as variants to his own [a], but still think of them as the same sound; while a phonetician listening it on the conversation, would note that three separate phonemes had been used. Thus, the number of phonemes that exist for a given individual may be said to depend upon his past experiences with language and upon the keenness of his awareness of variations in speech sounds. In one sense, it may justly be said that the study of phonetics is an attempt to increase one's awareness of phonemes and of phonemic variants.

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[4] For explanation of the modifier ~ see page 200.

In our attempt to evolve a practical working definition of a phoneme, we have stressed two concepts: *variation* in the production of speech sounds, and *awareness* of these variations by individuals who hear them. Although simple definitions are likely to be misleading, we may say that the concept of a phoneme is present whenever an individual becomes aware of a variation in the production of a given speech sound that is divergent enough to make him feel that the speaker has used a different sound from the one he, himself, would have used. This statement has three implications. First, the phoneme concept is present in all individuals who have speech even though they may not have the vocabulary for expressing the concept. Second, a phoneme exists only by comparison. It is not a static entity, but a fluctuating awareness of differences. Third, different individuals may have different sets of phonemes.

We should remind ourselves at this point that the phoneme theory is primarily a utilitarian concept that arises of necessity from the very nature of spoken language. Speech employs sounds that are constantly varying. Since these sounds are used as symbols, it is imperative that limits be set on this variation. This is necessary, because symbols are by nature arbitrary signs that can have meaning only when mutually agreed upon and recognized. These symbols may vary in any direction and to any extent just so long as they are still recognized as the intended symbol and are not confused with some other symbol or not recognized at all. We need the phoneme concept to keep us aware of these variations. Otherwise, when we describe a speech sound and assign it a symbol, we are prone to fall into the error of regarding it as a fixed unit in the language.

Each individual, then, has his own set of phonemes, that is, his own limits of allowable variation for each speech symbol. It seems to follow that the phonemes of a whole language can be thought of only in terms of a cross-section of the phonemes used by the individuals who speak the language. If this is true, it follows that no single individual will use, or be aware of, all of the phonemes of his language. That this situation actually exists is easily observable. In large sections of the country the constellation of sounds symbolized by [ɝ] is a standard phoneme, and in other sections [ɜ] is used. Many individuals are aware of and use only one of these forms. When such an individual hears the other form used in a word, he will usually understand the meaning because of the context, but he is aware of a difference that cannot be explained in terms of a variation of his own sound. Still other individuals may be aware of, and even use, both sounds. To be exact, we would have to say that if an individual uses both sounds indiscriminately without any awareness of a difference, only one phoneme exists for him. On the other hand, an individual who is quite aware of a difference between the two sounds and uses one in one situation or context and the other in another, has two phonemes. This same type of illustration could be applied to other differences in sounds existing between individuals and between sections of the country. However, we must recognize that the similarity in phonemes throughout the country is much greater than the difference. This is more true in America than in many other countries. The speech of any section of this country is generally intelligible in any other section. Intelligibility depends almost solely upon the use of phonemes that will be recognized by the listener, whereas the other differences that we note arise from various sources, one of which is the use of variants from within the same set of phonemes.

It follows, of course, that two languages will have different sets of phonemes to a much greater extent than two individuals or two sections of a country speaking the same language. Thus, the Italian language has an [ŋ] sound but no phoneme because this sound is always heard as a variant of the [n]. In some words, the French language employs a sound close to our [æ], but it is regarded as a part of the [a] phoneme. Several Romance languages do not have separate [i] and [ɪ] phonemes, but have instead a single phoneme that appears to lie between the two. Zipf[5] makes the interesting observation that in the speech of North China a voiceless plosive, such as [k], is one phoneme when followed by a puff of air (aspirated) and another when this puff is absent (unaspirated). That is, in that language, there are two [k] phonemes, and the listener has to be aware of this difference or he may misinterpret meaning. In English, both types of *k* are used, but without any difference in symbolic significance, hence they are variants of one phoneme. Despite these differences, however, two related languages are more similar in their phonemic structure than they are different.

We may summarize this discussion by saying that the phoneme theory is to be regarded as a practical concept designed to explain the variation of the speech sounds that form the basic units of a language. Since the limits imposed upon this variation must ultimately be based on individual perception, each individual has his own set of phonemes, and the phonemes of a language are to be thought of as the sum of the phonemes used by the speakers of that language. We need to remember, also, that the phonetic alphabet is really a phonemic alphabet; that is to say, it provides one symbol for each observed phoneme in the language. Although we often use the terms interchangeably, we should understand that *speech sound* means any single utterance of one of the symbol units of speech, whereas the word *phoneme* includes all of the variants of a given sound that are recognized as that particular symbol. Speech sounds can be measured and analyzed, a phoneme cannot. In broad transcription, we write in terms of these sound families, or phonemes. In narrow transcription, we attempt to record some of the variants within the phoneme.[6]

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[5] George K. Zipf, *The Psycho-Biology of Language*, p. 56.

[6] The reader should understand that this discussion presents the opinions of the authors. There are many views of the phoneme, some of which differ widely. The writers have attempted to present the phoneme as a practical solution to an immediate problem in the study of phonetics.

We should perhaps make special mention of one view of the phoneme that is quite

7. Approaches to the Study of Phonetics

The student who takes up the study of phonetics is soon faced with the task of classifying speech sounds. This task is frequently made unnecessarily confusing and burdensome, because we do not clearly recognize that it can be approached from at least three distinct angles. The ordinary classification is sometimes confusing to the beginner because it uses all three approaches in a haphazard manner, and the resulting mixture of terminology is bewildering. In order to lessen this confusion and to lay the foundation for an orderly presentation, the writers preface their own classification by listing these three approaches and noting the terminology applicable to each:

(1). *The Acoustic Approach.* In the first place, the study of speech sounds can be approached from the standpoint of the effect produced by these sounds upon the auditory mechanism. This is an acoustic approach. Such a study is chiefly concerned with problems of pitch, volume, resonance, pressure patterns, duration, etc., that is to say, acoustic problems. Under such a scheme, speech sounds are classified on the basis of their acoustic effect and in terms that apply to auditory sensation. All sounds are first divided into vowels, semi-vowels, diphthongs, and consonants. For the vowels, there is no clear-cut acoustic

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similar to the one presented here. In Chapter III of his book, *The Psycho-Biology of Language*, G. K. Zipf defines the phoneme as "the smallest unit of distinctive significance." He goes on to say, "Two sounds of a language may be considered either as identical or as appertaining to the same phoneme, if a substitution of one for the other throughout the entire language will not lead to the confusion of meaning of a single word." The question immediately arises: confusing to whom and under what conditions? A Northerner who had never heard the [ɜ] might not be confused as to the meaning if he heard it for the first time in the phrase "the [bɜdz] in the nest," but if the phrase happened to be "the [bɜdz] on the tree," he might easily be confused as to whether *buds* or *birds* was intended. To a considerable number of people [ant] means *ant* and [ɑnt] means *aunt*, and meaning would be confused if the sounds were interchanged. To these people [æ] is a variant of the phoneme [a]. This might serve to establish [a] as a phoneme distinct from [ɑ]. Is it possible now to establish [æ] as a phoneme distinct from [a]? In the speech of certain individuals, yes. There are many people who will not accept [ɑ] as the proper phoneme to use in *aunt*, who yet make a sharp distinction between [æ] and [a] by always using [æ] in *ant* and [a] in *aunt*. Thus, by indirection, we have established that all three sounds, [æ], [a] and [ɑ], are phonemes to certain people and thus phonemes in the language as a whole. If Professor Zipf's criterion for determining the phonemes of a language can be interpreted as including this type of analysis, the two points of view may be said to be closely allied.

classification, although such terms as *stressed*, *unstressed*, *long*, *short*, *weak*, *strong*, *more or less sonant*, *more or less resonant*, *high pitch*, and *low pitch*, are auditory terms or adjectives used to indicate the type of sound. Similarly the words *tense* and *lax*, although they really should be used to indicate the degree of muscle tension, have been used so often to describe sound quality that they are now almost auditory terms. It should be remembered, also, that Daniel Jones' cardinal vowel series[7] is essentially an acoustic classification. It is true that the eight cardinal vowels have their basis in certain positions of the articulatory mechanism, but the crux of the scheme lies in the recording of these eight vowels on records so that the permanent *acoustic* standards are available. The student then makes an acoustic comparison of his vowels with those of the cardinal vowel series.

With the consonants, there is a fairly complete set of terms to describe the sounds according to this approach. All consonants are first separated into *sonants* and *surds*. These two main classifications are further subdivided by such terms as *sibilants* [s, z, etc.], *fricatives* [ʃ, θ, f, ʒ, etc.], *affricatives* [tʃ, ts, dz, etc.], *plosives*, [p, d, k, etc.], *nasals* [m, n, ŋ, etc.] and *liquids* [l, r, w, etc.]. The words *rolled*, *trilled*, *scraped*, *clicks*, *aspirated*, *whispered*, *silent*, *voiceless*, and *voiced*, etc., are also auditory terms that are used frequently.

(2). *The Placement or Position Approach.* A second approach to the study of phonetics is what we may call the position or placement approach. Such an approach takes up the study of speech sounds from the standpoint of the position of the articulatory mechanism when the sounds are produced. Specifically, the investigator wishes to know the position of the tongue, soft palate, mandible, and lips for the production of every speech sound. X-ray and palatographic studies are examples of research using this type of approach. The placement approach involves a study of anatomy in order to determine the nature of the structures making up the speech mechanism and the positions that these structures are capable of taking.

There are in the literature a large number of terms dealing with speech sounds that designate placement or are descriptive of position. Vowels, for example, are divided into *front*, *mid*, and *back* vowels. The

[7] For a discussion of the cardinal vowel diagram, see Chapter 5.

front vowels are subdivided into *high-front*, *mid-front*, and *low-front*, and similarly for the mid and back vowels. In addition, the terms *close*, *half close*, *half open*, *open*, *narrow*, and *broad*, are used to describe vowel sounds. For the consonants this placement terminology is even more abundant. The terms *bi-labial*, *labio-dental*, *dental*, *alveolar*, *retroflex*, *palato-alveolar*, *palatal*, *velar*, *uvular*, *pharyngeal*, *glottal*, *lingua-dental*, *lingua-rugal*, *lingua-palatal*, and *lingua-velar* are all used to describe positions of the articulatory mechanism.

(3). *The Kinesiologic Approach.* Still a third approach to the study of phonetics is the kinesiologic, or movement, approach. It is closely related to the study of positions discussed above and usually goes hand in hand with it. There is, however, a different emphasis. The investigator wishes to know, not only the position that the speech mechanism was in when the sound was made, but also what movements of the mechanism were necessary to produce that position. If the study be carried even further, it involves the determination of the muscles in contraction to produce those movements and the nerve centers and paths by which the activating impulses reached the muscles. There are relatively few terms that apply strictly to a kinesiologic approach. The words *continuant*, *stop*, and *glide*, however, are descriptive of movement rather than of position or acoustic effect.

8. OVERLAPPING OF THE VARIOUS APPROACHES

As has been suggested before, any one approach is seldom followed consistently or used solely as the basis for a classification of speech sounds. Each approach has its contribution to make to the field and the student's understanding of phonetics cannot be well rounded if any one of them is left out of consideration. There is some danger that the student will become confused by the apparent conflict in terminology. For example, the sound [s] might correctly be referred to as: a surd continuant; a voiceless, continuant fricative; a sibilant; or a whispered, lingua-dental continuant. It could also be called a voiceless, lingua-dental, continuant fricative. Given this name, *lingua-dental* represents the placement approach, *continuant* the movement approach, and *fricative* the acoustic approach. This apparent confusion is easily overcome if the student remembers that the terminology is drawn from three different sources and studies each term carefully.

9. THE APPROACHES USED IN THIS BOOK

It is our aim in Section II, "Kinesiologic Phonetics," to present primarily a movement approach. This is impossible, however, without also taking into consideration the position taken by the speech mechanism for the production of each sound, thus involving indirectly the placement approach. Section III, "Phonetic Metamorphology," embodies the application of phonetic principles to the problem of sound changes. Chapter 14, "Acoustic Changes," is written from the auditory approach, while Chapter 15, "Physiologic Changes," involves largely a kinesiologic approach.

10. PROBLEMS IN THE STUDY OF PHONETICS

A number of problems arise in the very beginning of an attempt to study the speech sounds of a language. It will perhaps be advantageous if we take up at this time some of the more pertinent of these problems and discuss them briefly. This should serve to give an additional insight into the field of phonetics and to prepare the student for a better appreciation of the material that follows. Eight such problems are discussed in the following pages.

(1). *The Problem of Determining the Speech Sounds Present in a Given Language.* Fortunately, the average student who takes up the study of a language, either native or foreign, is not faced with this task. It has already been done for him by competent authorities and he is, so to speak, handed the speech sounds on a platter. The sounds of English, for example, have been studied by phoneticians and language experts over a long period of time, so that for us the problem of determining these sounds is largely already solved. Suppose, however, that the student were a research worker studying a totally unknown African dialect. It is obvious that his first task in learning the language would involve learning the sounds of that language. (Many people, it should be noted, learn to speak a language without having any conception of the separate sounds that make up the language.) Our research worker would then have the task of analyzing the speech into its separate components, that is, speech sounds. This would involve an intensive study of the language, using the acoustic and placement approaches, to break it up into its phoneme units.

(2). *Problems Arising from the Variation in the Way a Given Individual Produces the Same Speech Sound at Different Times.* It has been demonstrated experimentally time and again that such variations exist that no speech sound is ever produced twice in exactly the same way, even by the same individual. We have already mentioned the possibility of producing the *t* sound by different adjustments, but even when the individual attempts to use exactly the same movement, there is still some variation. For example, two palatograms of the sound [t] made under what appear to be exactly the same conditions and with a special effort to produce precisely similar sounds, will always show some, and often considerable, variation. This variation is present in all speech sounds and is especially noticeable in the vowel sounds. It is customary to describe a certain position for each of the sounds of speech. But if so much variation exists, and if any sound can be, and apparently is, made in a number of different ways but never in exactly the same way, the question naturally arises as to whether anything is to be gained by a study of the movements made in producing those sounds. There are several reasons for an affirmative answer to this question.

The variations that occur in the speech of any one individual are due largely to three causes. First, from a theoretical standpoint, an exact repetition of a movement made by a living, changing organism is an impossibility. However, we may justifiably dismiss such variations as being too minute to make any practical difference. Such differences are more than offset by the counteracting tendency of the mechanism to follow the line of least resistance and stereotype the movements. Some variation will always exist but any attempt to assume that the movements involved in the production of speech sounds are of a haphazard and hit-and-miss nature is in direct contradiction to all of our knowledge concerning habit formation and the laws governing muscular contraction and the conduction of nerve impulses.

In the second place, variations in movement occur as the result of adjustments made by the articulatory mechanism in compensation for changes in the relations between various parts of the speech mechanism as a whole. For example, speaking with the head bent forward necessarily demands a different muscular adjustment than speaking with the head bent backward or to one or the other side. For this this reason, there will always be some variation in movement when the same sound is produced under different structural conditions.

Lastly, the influence of neighboring sounds causes variation in the way a given sound is produced. It is obvious that the nature and extent of a given movement will depend in large degree upon the point at which the movement begins and ends. Again using the sound [t] as an example, we note that in each of the four words, *cut*, *kit*, *list*, and *lint*, there is a sound that is recognized acoustically as a *t*. Yet in each of these words, the movement begins from a different positions, i.e., the positions of [ʌ], [ɪ], [s] and [n], respectively. Carried to its logical conclusion, this observation means that there are as many slightly varying movements for the production of the sound [t] as there are combinations of that sound with other sounds in the languages.

It will be seen at once that all this points to an almost unlimited number of minute variations or movements. An attempt to analyze all of these variations would present a task impossible of achievement. However, the crux of the situation lies in the fact that there is always a fundamental movement that remains essentially the same. An analogy may be drawn from the movements in writing in which all three of the conditions mentioned above that produce variation are likewise present. It is possible to form the letters of the alphabet in any number of ways, but in ordinary writing these movements tend to become fixed and stereotyped so that we can recognize without difficulty the handwriting of a friend, while experts in the subject can identify writing that has been carefully disguised. Variations always exist but they are comparatively slight, and the movements always tend toward standardization. That this principle is also true of the speech mechanism is indicated by the findings of Trevino and Parmenter[8] in their x-ray studies of the positions for vowel sounds.

In terms of muscle movements, the situation may be summarized thus: The general direction of the movement and the muscles that produce it remain essentially the same. The variation is a matter of *dif-*

[8] *The Quarterly Journal of Speech*, June, 1932, pp. 351–359.

ference in the degree of muscle movement and *not of type.* This is equivalent to saying that all of the members of a given phoneme are produced by the same fundamental type of movement. One or two exceptions to this statement will be noticed later. The term *speech sound,* as it is used in this study, should be taken as referring to the typical member of the corresponding phoneme. Likewise, in the section on "Kinesiologic Phonetics" the movements described for a given sound are the fundamental movements requisite to the production of a typical member of that phoneme.

We may conclude then that an analysis of the typical movements occurring during the production of speech sounds is of value, and that general descriptions of these movements can be made that will be applicable to all normal speech.

(3). *Problems Arising from the Variation in the Way Speech Sounds Are Produced by Different Individuals and in Different Sections of the Country.* Still another problem of variation that arises in connection with the study of speech sounds is the difference in the way various individuals produce a given speech sound. This variation is often especially pronounced in different sections of the country. In general, these variations are due to three causes: (1) differences in the structure of the speech mechanism; (2) differences in the way individuals hear the various sounds; and (3) those purely local or sectional differences that arise in communities where speech develops along tangents different from those in other sections. It should be remembered that the variations existing in dialects are often not caused by differences in the way the sounds themselves are produced, but, rather, by the substitution of one sound for another, and also the broadness of the phoneme in one section as against another.

We have mentioned that in any one individual, variation in the production of sounds is held in check by two factors, one an acoustic factor that operates because of the necessity of keeping the sounds within their respective phonemes, and the other a physiological one that operates because of the tendency of the mechanism to stereotype movements. In differences between individuals, however, it is obvious that only the acoustic factor is in operation. This serves to keep the production of sounds similar in different individuals only insofar as a given acoustic effect can be produced by only one adjustment of the mechanism. That this factor is only rather loosely binding can be easily demonstrated by experimenting a little with the making of the same sound (acoustically) by different adjustments. It will soon be seen that almost any sound can be produced in different ways and still remain acoustically about the same. This points to a greater degree of variation among individuals than in one individual.

Even taking into consideration all of these factors, we are, however, still safe in assuming that the movements by which one individual produces a given sound are fundamentally the same as those of another individual. Differences in structure will sometimes force a different adjustment but the structures are fundamentally alike. The same principle holds here that applies to variations within the individual, namely, that the variations are usually of degree rather than of kind.

If the above is true, it would seem worth while to study the movements involved in the production of speech sounds, not with the idea that the results can be applied in detail to all individuals, but, rather with the understanding that these are typical movements that give the essential factors in the production of the sound under consideration.[9]

(4). *Problems Involved in the Consideration of a Given Speech Sound as It Is Produced in Isolation Versus That Same Sound When Present in Continuous Speech.* In our study of phonetics, we sometimes lose sight of the fundamental fact that speech is not a series of isolated sounds, but a smooth-flowing, continuous affair in which, wherever possible, sounds are blended together and the muscular process made continuous from one sound to another. This principle, inherent in the physiological mechanism, is again a matter of conserving energy and saving time. The reader can demonstrate this easily for himself by taking a sheet of paper, placing on it a broken series of a dozen or so dots, and then drawing a line that will hit each dot accurately, at the same time stopping at each dot, as in Figure 1. Now put down the same dots and with one sweeping movement, draw a line that will come at least reasonably close to each of the dots, as in Figure 2. It is obvious that the second movement is much easier and faster. Just as it takes more power to start and stop a car than to keep it going once it is started, so the speech mechanism finds it easier to make a continuous movement than a series of stops and starts. It is obvious, also, that the continuous type of movement is less accurate than the other, that is, there is a tendency to approach in the general direction of the dots but it is more difficult to hit them exactly.

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[9] Students interested in pursuing this subject farther should read Zipf, *The Psycho-Biology of Language.* See especially Chapter III, "The Form and Behavior of Phonemes."

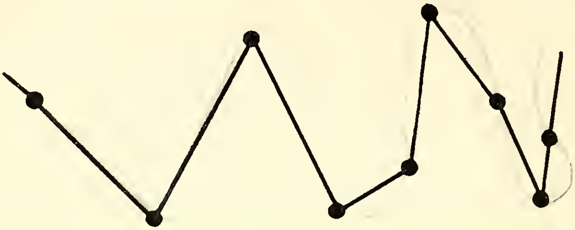

Figure 1.—Schematic illustration of slow and careful speech.

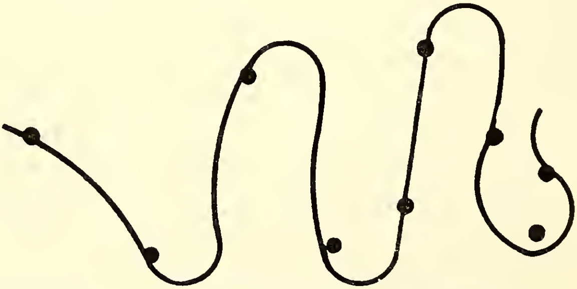

Figure 2.—Schematic illustration of normal continuous speech.

We are here introduced to two principles that wage eternal warfare in a language, i.e., the necessity of keeping a speech sound within its phoneme versus the strong physiological tendency of the mechanism to smooth out the movements and eliminate breaks. The first is essential, but the second is easier. If we are to communicate by sound symbols, we must have certain distinguishable symbol units, but the physiological mechanism constantly seeks to destroy the integrity of these units by leveling them down. Academicians in general, and speech teachers in particular, do valiant battle for the integrity of the phoneme and against slovenly, inarticulate speech. Their battle cries are, "speak distinctly," "don't slur those consonants," "pronounce those final *t*'s and *d*'s," "don't drawl those vowels," "don't mumble," etc., etc. Meanwhile, shopgirls and factory hands and indeed many students go blithely on with such time and energy saving telescopings of the language as [lɛzgow] *let's go*, [dʒit-tʃɛt] *did you eat yet*, and [hɑjə] *how are you*. All of which is simply a way of dramatizing the problem of those who seek to inculcate in their students a desire for a clear-cut articulation and a distinct, understandable speech.

It is evident that the task of analyzing the movements in continuous speech is impossible of achievement. This means that the study of phonetics will perforce be largely a study of speech sounds in isolation because at present most of our methods and apparatus are adapted only to the study of sounds in isolation. If, however, the time ever comes when three-dimensional x-ray movies become practicable, we will be able to open up a veritable mine of information concerning the functioning of the speech structures.

It is also evident that the movements for the production of a given speech sound in isolation are somewhat different from those for that same sound in connected speech. Two factors are responsible for this. The first of these is the tendency of the mechanism to smooth out movements, and the second arises from the fact that the mechanism is constantly beginning the movement for a given sound from the position of the preceding sound and ending it by going to the position of the following sound. Read again the discussion regarding the *t* sound on page 29. When *t* is pronounced in isolation, the mechanism starts from a resting position and returns to it when the sound is finished. When the *t* is pronounced in the word *little* [lɪtʟ̣], however, the movement is from the [ɪ] position to the [t] and from the [t] to the [ʟ] position.

These two factors will produce a large number of minor variations, especially in the way in which the movement begins and ends, but they will not influence, to any great extent, the main movement required. In the pages that follow, we shall for the most part be considering speech sounds in isolation. However, we should never lose sight of the fact that speech is a continuous process in which these isolated movements are welded into a relatively smooth-flowing whole.

(5). *The Problem of Determining the Movements Involved in the Production of Speech Sounds.* The problems that have been discussed so far have had to do mainly with factors that work to cause variation in the way in which a given speech sound is produced. We come now to a consideration of the difficulties involved and the methods employed in a study to determine the movements that occur when such a speech sound is produced. Four methods of investigation have been found useful in such studies.

A. Subjective analysis. In using this method, the investigator makes a certain sound or assumes the position necessary for its production and then seeks to determine the position and movements of the articulatory mechanism by an analysis of the sensations resulting from this activity. This method is essentially subjective and for this reason its accuracy is open to question. Its great disadvantage lies in the fact that sensations from this region are often not clearly localized. However, such a study does aid materially in analyzing movements that are otherwise difficult to observe and when used in conjunction with other methods may yield much useful information.

B. Direct observation. Much is to be gained by direct observation of the movements that occur during the production of a given sound. Movements and positions of the lips and mandible can be studied accurately by this method. Movements of the tongue, soft palate, and pharyngeal walls can also be observed either directly or with the aid of a mirror. Direct observations of these parts, however, is not so satisfactory, since they are more or less hidden from view, especially during the articulation of certain sounds. In observing movements inside the mouth cavity, care must be taken to avoid disrupting the ordinary relationships existing between the various parts of the articulatory mechanisms during the production of the sound under consideration. For example, holding the mouth wide open in order to obtain a clearer view of the tongue may force that organ to make adjustments resulting in movements different from those that would occur in ordinary speech. At best, many movements are so slight or so completely hidden from view as to be incapable of direct observation. Within these limitations, however, this method of study is both fruitful and reliable.

C. PALATOGRAPHIC STUDIES. Studies of this type employ a hard rubber or metal plate formed to fit the roof of the mouth in a manner similar to the mounting for a set of false upper teeth. This artificial palate is moistened, dusted with a fine white powder (calcium carbonate is very satisfactory), and placed in position. If the sound to be studied is then made and the plate removed, those movements in which the tongue makes contact with the roof of the mouth will be indicated by a removal of the powder from the artificial palate and a corresponding deposit on the tongue. Obviously, care must be taken to avoid any movements other than those made in producing the sound. The presence of the plate results, at first, in a feeling of clumsiness and probably in some distortion of movement, but with a little practice these difficulties are easily overcome. Such studies yield interesting and accurate data, but their application is limited to those movements in which the tongue makes a contact with some part of that portion of the roof of the mouth covered by the artificial palate. Thus there are a number of sounds that cannot be studied at all by this method and, in the case of those that can, one cannot be quite certain that there were not other important movements occurring that were not registered on the plate.

D. X-RAY STUDIES. The application of x-ray photography to the analysis of speech sounds has yielded valuable information. It has been used extensively, especially in connection with vowel studies.[10] In essence, such a study involves the making of an x-ray picture of the articulatory mechanism during the production of the sound under consideration and an analysis of this picture to determine the positions taken by the various structures. Usually, a lateral view is taken. A marker of some sort must be employed to make visible such soft structures as the tongue and soft palate. A gold chain, gold leaf, or some adhesive compound containing barium is employed. There is, of course, always the possibility that these materials when placed on the tongue may cause a distortion of its normal movements. Another disadvantage lies in the fact that the view obtained is limited to one perspective, namely that of a sagittal section through the midline. For example, if the marker used is a gold chain running along the midline of the tongue, the resulting x-ray picture will show the position of that organ only at its midline. Such movements as narrowing or broadening of the tongue, and depression or elevation of its sides will not be shown.

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[10] See especially in this connection: G. O. Russell, *The Vowel*, Ohio State University Press (Columbus, Ohio, 1928), and *Speech and Voice*.

It will be seen from the above discussion that each of the four methods of studying speech sounds has both advantages and disadvantages. An analysis based on any one method would certainly contain many inaccuracies. Each method is more valuable when its results are checked and interpreted in the light of results obtained from other approaches. In the analyses that follow, information has been drawn from every possible source and every method utilized that would aid in the formation of a composite picture of the movements and positions of the articulatory mechanism during the production of the sounds analyzed.

(6). *The Problem of Distinguishing Between Essential and Accessory Movements*. Still another problem that arises in such a study is that of determining which movements are essential to a given sound in contrast to those that are merely accessory in their nature. As an example, we may cite a portion of a study made by C. H. Lightoller on the movements of the facial muscles in the production of certain sounds.[11] Lightoller observed the transverse portion of the nasalis muscle in rather vigorous contraction during the production of certain sounds, especially the plosives. It is inconceivable that this action of the nasalis muscle in constricting the nostrils is essential to the production of these sounds. It must be regarded as an accessory movement that accompanies the sound but plays no necessary part in its production. A still more common movement is the lip rounding that usually accompanies [ʃ] but is not essential. Note the variation in the production of [ʃ] in *shoe* and *she*.

In this study, we have followed the policy of including only those movements that are essential to the normal production of the sound. A movement may be regarded as essential to the normal production of a certain sound, if the inability to make that movement results in a total inability to make the sound or in the production of the sound by an adjustment other than that typically used.

[11] *Journal of Anatomy*, Volume 60, No. 1, 1925, pp. 2–45.

(7). *The Problem of Determining the Muscles and Nerves That Function in the Production of Speech Sounds.* Even when the movements of the mechanism are determined, and those that are non-essential eliminated, the picture is still incomplete without an analysis of the muscles and nerves that function in the production of these movements. This brings phonetics into the fields of anatomy and neurology. Such a study is the logical completion of the analysis of speech sounds, but it is perhaps a little too involved for the beginning student. It would begin with an analysis of the muscles of the articulatory mechanism and a study of their nerve supply, followed by a determination of the movements that the muscles are capable of making and the effect of these movements on the structures upon which they act. This information, coupled with information about the movements necessary to the production of each speech sound, would provide the basis for determining the muscles and nerves involved in each sound. The latter material is essentially that given here in the section on "Kinesiologic Phonetics." The material on muscles and nerves can be obtained from any anatomy text[12] or from books in the field of speech science.[13] The student will find it interesting to attempt in a rudimentary fashion to make a synthesis of these two types of material.

(8). *The Problem of Selecting a Point of Departure for a Description of the Movements Involved in the Production of a Given Sound.* There remains one further matter to be considered. We have stated that any description of the movements involved in the production of speech sounds must of necessity deal largely with these sounds in isolation. However, even though sounds are considered in isolation, there still remains the necessity for some fixed point that will serve as a basis of comparison in describing the movements that follow. It seems advisable, therefore, to designate some arbitrary position of the articulatory mechanism as the fixed point at which all movements to be described will begin and end. For this purpose, we have chosen the position prevailing in normal, quiet respiration. This position will be described in detail later.[14] This is, practically speaking, the resting position of the speech mechanism, insofar as any living mechanism can reach a resting state. It will be referred to hereafter as the "neutral position." An analysis of any given sound will include, therefore, a description of the movements of the mechanism from the time it leaves the neutral position to the termination of the sound.

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[12] D. J. Cunningham, *Textbook of Anatomy*, 6th Ed., Oxford University Press (New York, 1931). Henry Gray, *Anatomy of the Human Body*, 23d Ed., Lea and Febiger (Philadelphia, 1936), or any standard textbook on anatomy.

[13] L. S. Judson and A. T. Weaver, *Voice Science*. F. S. Crofts (New York, 1941), Ch. XI. G. W. Gray and C. M. Wise, *The Bases of Speech*, Harper and Brothers (New York, 1934), Ch. V.

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[14] See Chapter 4.

Chapter 3

A Brief Review of the Speech Mechanism

1. INTRODUCTORY STATEMENT

Since the kinesiologic approach to the study of speech sounds demands of the student a certain technical knowledge of the speech mechanism, a brief review of the structures making up this mechanism is here presented, designed to acquaint the student with the structures and their functions and to familiarize him with the terminology of the subject. This discussion will not, however, provide an adequate background to students who are unfamiliar with the material treated. Such students may wish to read more extensively in other books that treat the subject in detail.[1]

All English speech sounds normally produced have one factor in common: they are based upon the utilization of the moving column of air furnished by the expiratory phase of the process of respiration. As this column of air passes through the larynx, it may be set into vibration by the action of the vocal folds when the glottal edges are approximated, or it may be allowed to pass through a relatively unrestricted aperture. Thus, the action of the laryngeal mechanism forms the basis for a division of all sounds into two main groups: (1) voiced sounds, i.e., those formed from a stream of air that has previously been set into vibration in the larynx, and (2) voiceless sounds, i.e., those formed from a column of air that has been allowed to pass through a relatively unrestricted glottal opening, in other words, non-vibrated.

This vibrated or non-vibrated column of air leaves the larynx to enter the pharyngeal cavity. From the pharyngeal cavity, proper, it may enter the nasopharynx and nasal chambers or pass through the faucial orifice into the oral cavity, or it may divide, part passing into each cavity. It finally leaves the body through either the oral (lips) or nasal (nostrils) orifice or both. These various cavities act as resonating chambers that distribute the energy of the laryngeal tone among its various overtones and thus give the voice its distinctive quality

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[1] Elizabeth Avery, Jane Dorsey and Vera Sickles, *First Principles of Speech Training*. D. Appleton Co. (New York, 1930) Ch. II. G. W. Gray and C. M. Wise, *The Bases of Speech*. Harper and Brothers (New York, 1934) Ch. III. L. S. Judson and A. T. Weaver, *Voice Science*. F. S. Crofts (New York, 1941), Chs. IX, X and XI. W. Mills, *Voice Production*, 4th Ed. J. B. Lippincott Co. (Philadelphia, 1913) Chs. II, VI and IX. J. M. O'Neill and A. T. Weaver, *The Elements of Speech*. Longmans, Green and Co. (New York, 1934) Ch. V.

In the course of its outward passage, this column of air may be subjected to an almost unlimited number of modifications produced by different adjustments of the articulatory mechanism. Many, though not necessarily all, of these alterations in the outflowing stream of air result in physical vibrations which are interpreted as sound. All of these sounds so produced are potential auditory symbols, but only a part of them are stereotyped as to production and symbolic significance and used as speech sounds.

This introduction lays the groundwork for a division of the speech mechanism into four main parts: the power mechanism, the vibrator mechanism, the resonator mechanism and the articulatory mechanism. Let us hasten to say that this division is largely for the purposes of description and that the speech mechanism functions as a whole and not in four parts. Furthermore, there is considerable overlapping in both structure and function. For the purpose of this study we are most interested in the articulatory mechanism. We may now proceed to a brief discussion of these four mechanisms with particular emphasis on the last.

respiratory system

2. The Power Mechanism

lungs, diaphragm

The power mechanism for speech is the same as that employed in the vital process of respiration. Respiration, as the layman uses the term, means the act of getting air in and out of the lungs. Technically, the term refers to the basic function which involves the exchange of gases that occurs when a living organism takes in oxygen and gives off carbon dioxide. This exchange of gases takes place at two points: internally between the blood stream and the tissues of the body, and externally, between the blood stream and the air contained in the alveoli. The former is called internal, and the latter external, respiration. The term is used broadly in this book to refer to the whole process of breathing.

The power mechanism is formed by those parts of the walls and contents of the thorax that are concerned in the respiratory process. The thorax, commonly called the chest, includes the whole middle section of the body between the neck and the abdomen. The bony framework of the chest is referred to as the thoracic cage. The thoracic cage is bounded superiorly by the clavicles or collar bones; posteriorly, by the upper part of the spinal column and the posterior portions of the ribs; anteriorly, by the sternum, or breast bone, and the anterior portions of the ribs; laterally, by the middle portions of the ribs; and inferiorly, by the diaphragm. This bony cage is covered with various muscles and tissues that serve to form an air-tight cavity, the thoracic cavity. This cavity is separated from the abdominal cavity by the diaphragm, which is a muscular and tendonous sheet attaching to all the inner walls of the body cavity and acting as an important muscle in breathing. The thoracic cavity contains the lungs which are the essential organs of breathing, and, also, the heart, the thymus gland, and a number of major blood vessels and nerves. The lungs are two in number, one on each side of the thoracic cavity, which, under normal conditions, is completely filled by them and the other organs. Each lung is covered by a membrane and subdivided internally into an almost infinite number of air tracts, roughly similar to a tree upside down and minus the roots. The largest of the passageways is the trachea, a cartilaginous air tube running from the lower border of the larynx to approximately the notch between the two collar bones. The trachea bifurcates to form the bronchi and these, in turn, subdivide first into bronchioles and then continue to branch out until each air passage ends in the almost invisible alveolar sacs. By means of the trachea, the air passages in the lungs are connected with the larynx and pharynx, through the latter of which the air stream may pass out into the nasal chambers, to exit through the nostrils, or into the oral cavity to exit through the mouth.

Inhalation, the drawing of air into the lungs, and exhalation, the driving of air out of the lungs, are accomplished by changes of pressure within the thoracic cavity. In inhalation, the muscles surrounding the thoracic cage, especially the diaphragm, act to increase the size of the chest cavity, thus decreasing the pressure therein, and drawing air into the lungs. We are not here concerned with a detailed enumeration of the muscles that produce this action. Suffice it to say that the breathing process brings into play a large number of the trunk muscles. This is particularly true of forced or labored inhalation. The diaphragm and those muscles immediately surrounding the thoracic cage are most important, but muscles of the back, neck, and even of the pelvic region, play more or less important roles. The number of accessory muscles brought into play and the degree of the muscular contraction determines the force of the inhalation. These muscles act to increase the size of the thoracic cavity in all of its diameters, i.e., antero-posteriorly, laterally, and vertically.

In quiet breathing, exhalation is accomplished largely by the relaxation of the muscles active in inhalation, plus the elastic recoil of the tissues themselves. This decreases the size of the cavity and forces air out of the lungs. In controlled breathing, as in speech, the muscles that are antagonistic in action to the inspiratory muscles come into play to control the rate and force of the exhalation. The control of the ascent of the diaphragm by means of the action of the abdominal muscles is one important factor in giving the type of speed and power control necessary to speech. The lungs, it should be noted, except for the elastic recoil of their own tissues, play a purely passive role in breathing. They expand as the thoracic cavity enlarges and decrease in size as it contracts.

In this brief review of the power mechanism, we have seen that its primary biological function is to provide a way for the human organism to take in oxygen and eliminate carbon dioxide. Secondarily, it also produces a controlled column of moving air that furnishes the motive power for speech, thus providing the energy that runs the vibrator which is to be described in the following pages. We should add that breathing for speech purposes, though it employs essentially the same muscles, is controlled from brain centers other than those used in ordinary respiration. Breathing for speech shows other characteristic differences from ordinary breathing. In breathing for life purposes, inhalation and exhalation occupy about the same period of time, and inhalation is an active muscular process while exhalation, unless forced, is largely passive. In breathing for speech, the inspiratory phase is speeded up and the expiratory phase lengthened. At the same time, exhalation becomes an active muscular process controlled in force and rate. Other differences have to do with the volume of air breathed and with the rhythm of breathing.

3. THE VIBRATOR MECHANISM

vocal folds

Given a source of energy, it is evident that the next step in the production of speech is the formation of sound vibrations that can later be formed into the symbol units of speech. The mechanism that produces these vibrations is the larynx (Figs. 3–7). The larynx, or voice box, is essentially an enlargement at the upper end of the trachea to form a valvular mechanism by means of which the outflowing air stream can be partially or entirely cut off. It is thus a continuation of the air passage from the lungs. It is located in the anterior portion of the neck

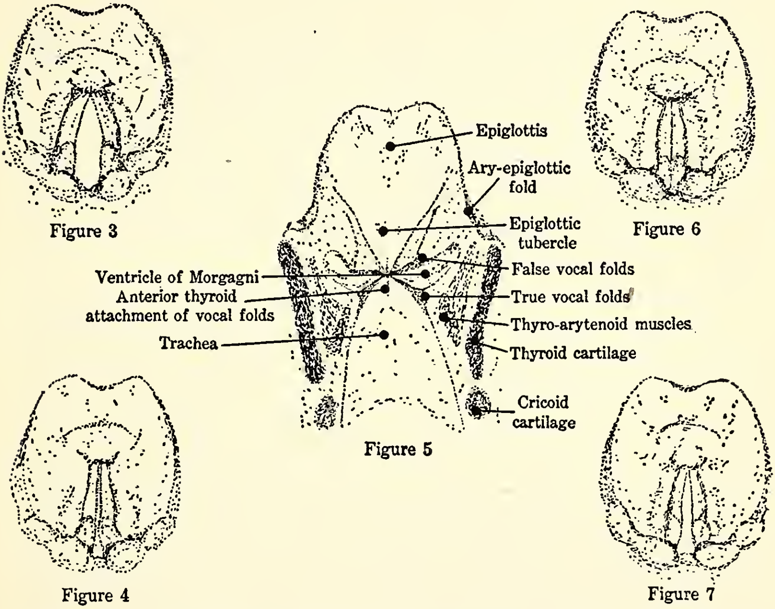

FIGURE 3.—The position of the glottis for breathing. FIGURE 4.—The glottis closed to the point of vibration. FIGURE 5.—Coronal section of the larynx. FIGURE 6.—The glottal stop position. FIGURE 7.—The whisper position.

and opens superiorly into the pharynx. Behind the larynx at its lower end, is the esophagus which is the food tube to the stomach. The esophagus opens superiorly into the laryngo-pharynx. The laryngo-pharynx is that portion of the pharynx that lies behind the upper part of the larynx.

The vocal folds form the valve itself. They are two strips of voluntary muscle with elastic tissue edges, running antero-posteriorly across the diameter of the larynx. The anterior attachment of the muscles is located slightly below the notch in the thyroid cartilage, which forms the protrusion called the "Adam's apple." The attachments are contiguous in front; when open, the folds spread in a "V" formation to their attachments on the arytenoid cartilages at the back of the larynx. The larynx itself has a semisolid framework of cartilages, ligaments, and tissues. A number of muscles acting upon this framework permit the vocal folds to be opened or closed and tensed or relaxed.

Like the other structures of the speech mechanism, the larynx has various vital functions. Through its control over the amount of air leaving the lungs and the pressure at which it leaves, it influences the circulation of the blood through the lungs and the amount of carbon dioxide eliminated. By complete closure of the vocal folds, air can be impounded under pressure within the lungs, thus giving the muscles of the thorax firmer attachments from which to work and increasing the strength of their pull. This "thorax fixation" function of the larynx is important in many bodily activities, particularly those requiring strong exertion of the thoracic muscles or a compressor action of the abdominal muscles. The larynx also plays an important part in the process of directing food and drink into the laryngo-pharynx and esophagus and in preventing the passage of foreign substances into the air tract.

Apart from their biological function, however, the vocal folds play an important role in the speech process, since it is through their activity that the sound waves are produced. From the speech standpoint, the vocal folds are capable of taking four important general positions. (See Figs. 3, 4, 6 and 7.) The first of these is a wide open position which allows the air column to escape with no appreciable noise. The second is a partially closed position which can also be called the whisper position, since the vocal folds are close enough together to produce the friction noises characteristic of whispering. The third, or phonating position, involves a very rapid, alternate closing and partial opening of the vocal folds in such a manner that the air column is allowed to escape in the rhythmical puffs of air that produce the sound waves typical of speech. In the fourth position, the vocal folds are held in the closed position, completely stopping the passage of the air stream. If, at the same time, the muscles active in controlled exhalation are brought into play, it is possible to put the air column below the vocal folds under considerable pressure. This last position is also called the "glottal stop position."

We are not here interested in a detailed description of the muscles controlling the vibrator mechanism nor in the exact manner in which the vocal folds function. Suffice it to say that the larynx, through its glottal valve, the vocal folds, utilizes the energy in the outflowing column of air furnished by the power mechanism to produce the sound waves that form the basis of speech.

the [illegible]

4. The Resonator Mechanism

The sound waves produced at the vocal folds are still far from being the finished product that we hear in speech. It is the resonators that give the characteristic quality to the voice (Fig. 9). The problem of resonance is very complex and cannot be treated in detail in this book. Essentially, however, these resonating cavities select certain of the complex series of frequencies present in the laryngeal tone and act to concentrate the energy represented by these frequencies instead of allowing it to be dissipated. The cavities contribute no energy to the sound waves; they act to conserve and concentrate energy already present in the laryngeal tone.

There are two general types of resonators, the cavity type and the sounding board type. The piano uses the sounding board type. This type can also be represented by placing a tuning fork on a table or desk. Horns use the cavity type. Both types of resonance are present in the speech mechanism. The sounding board type is illustrated by the chest walls, the bones of the head, the hard palate, etc. Cavity resonance is produced in the cavities of the larynx, pharynx, nose, and mouth. Of the four, the nasal and laryngeal chambers are relatively fixed in their form and consequently exert a rather constant influence. The pharyngeal and oral cavities, on the other hand, are subject to wide variations in shape, size, and orifice and thus have variable effects on the sound quality. The pharynx is divided into three parts: the laryngo-pharynx, which has been mentioned previously, the oropharynx, which opens into the mouth cavity, and the nasopharynx, which lies behind the soft palate and connects with the nasal cavities. It is generally, though not universally, agreed that the sinuses play little or no part as resonators. It is a matter in dispute as to just what and how much effect the subglottal cavities (i.e., those of the larynx below the vocal folds, the trachea, and the air spaces in the lungs) have on resonance.

The resonance factor is especially important with the vowels since here it is the chief factor that distinguishes one from another.

5. The Articulatory Mechanism

The resonated laryngeal tone described above is still not speech· Without the action of the articulatory mechanism (Figs. 8 and 9), there would be possible only a sound of variable pitch, volume, and quality—a sound that could be either continuous or interrupted by glottal action. It is obvious that a language built upon this basis would be essentially a series of vowel tones like the whine of a dog and would be quite inadequate to express other than emotional meanings. It is the function of the articulatory mechanism to break up and modify this laryngeal tone and to create new sounds within the mechanism itself. Strictly speaking, the verb *articulate* means to join together. Actually, this mechanism not only articulates, but also separates and molds the sounds delivered to it by the vibrator and resonator mechanisms. In addition, it creates new sounds within itself by utilizing the energy supplied by the power mechanism in such a way as to produce within the oral cavity friction noises that are independent of the laryngeal tone. Because of this, the articulatory mechanism assumes considerable importance to the student of phonetics. We may properly begin our review of this mechanism with a description of its parts.

We have already had occasion to speak of the mouth cavity (also called the oral or buccal cavity) as one of the important resonators (see Fig. 8). It is within this cavity that articulation takes place. In fact, the articulatory mechanism could be described as composed of the walls of, and the structures within, the oral cavity. This includes the tongue, lips, teeth, the mandible or lower jaw, the cheeks, the faucial pillars, the hard palate, the velum or soft palate, and the muscles composing or acting upon these structures. The hyoid bone, because of its influence on the movements of the articulator mechanism proper, is an important associated structure.

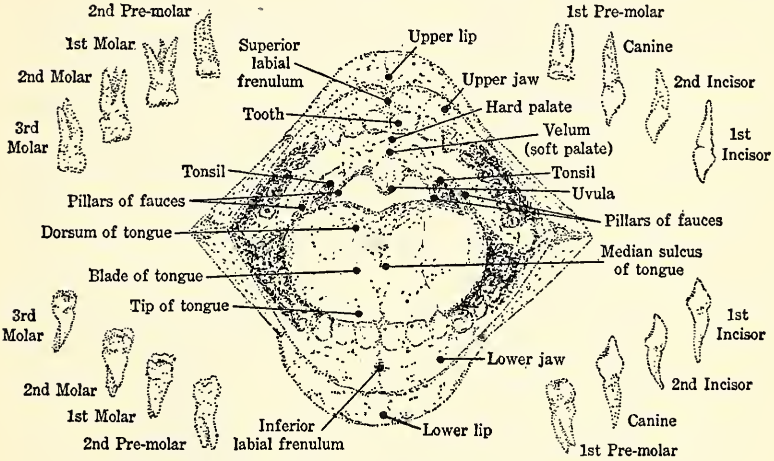

Figure 8.—Frontal view of the mouth cavity.

The posterior boundary of the oral cavity is the soft palate and the anterior pillars, or fauces. These are not articulatory structures *per se*. Rather, they form, together with the muscular walls of the pharynx, a two-way valve system by means of which the outflowing column of air can be shunted into either the oral or the nasal cavity or both. The velum, the muscular curtain that can be seen in the back of the mouth, is the most important structure in this valvular action. It terminates in a small, pencil-like structure called the uvula. Anteriorly, it is continuous with the hard or bony palate which forms the rest of the roof of the mouth. When the soft palate hangs relaxed and the oral cavity is closed at some point, the air stream is directed into the nasal chambers and out through the nostrils. On the other hand, certain muscles serve to draw the soft palate upward and backward at the same time that the pharyngeal walls are being drawn forward so that the port into the nasopharynx is closed and the air stream is forced into the mouth cavity.

The fauces are two pairs of muscular bundles that lie antero-posteriorly on either side of the tonsils. The anterior fauces, or pillars, arise from the root of the tongue, the posterior ones from the pharyngeal wall. Both arch upward to terminate in the soft palate. The former is sometimes called the glosso-palatine arch, and the latter the pharyngo-palatine arch. The anterior pillars mark the dividing line between the oral and pharyngeal cavities and the opening between them is the posterior, or faucial, orifice. The lateral walls of the oral cavity are formed by the inner surfaces of the cheeks, while the roof is formed by the hard palate and a limited portion of the soft palate. The lips and teeth form the anterior boundary. The lips are muscular bundles running, for the most part, in a circular direction and forming the anterior oral or bilabial orifice. The floor of the cavity is formed by the tongue itself, and by the mylohyoid muscle, a very important tongue muscle running from the hyoid bone to the base of the tongue.

The cavity contains of course the tongue and teeth. The teeth not only play a prominent part in the formation of certain sounds, but they serve also as useful landmarks in describing the position taken by the tongue in the production of other sounds. Attention should be drawn to the alveolar, or rugal, ridge, which borders the line of upper teeth and breaks the otherwise smooth curve of the dome of the hard palate.

The tongue is by far the most important articulatory structure. Five pairs of extrinsic and four pairs of intrinsic muscles enter into its makeup. Aside from its nerves, blood vessels, connecting and covering tissue, glands and taste buds, it is entirely muscular and thus capable of a wide variety of movements. For descriptive purposes in phonetics we divide the tongue arbitrarily into parts as follows: the tip, the ex treme forward edge, especially when the tongue is pointed; the blade, which includes the tip,—the whole front part; the dorsum, the upper surface, which is divided into a front portion that lies under the hard palate and a back portion that lies opposite the velum; and the root or radix, a term applied to the most posterior part of the tongue, where it attaches to the surrounding structures. In a position of rest, with the jaw closed, the tongue almost completely fills the mouth cavity. It would be difficult to over-estimate the importance of the tongue in articulation. Its ability to perform finely coordinated movements rapidly is essential to fluent speech.

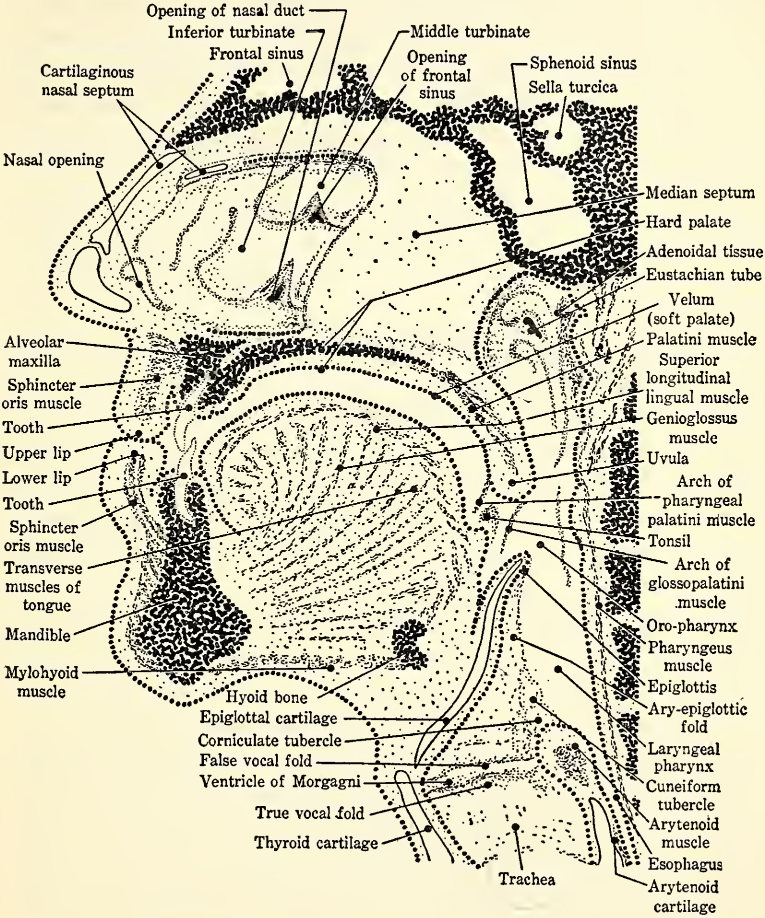

Figure 9.—Sagittal section of the head and neck.

We can complete our description of the articulatory mechanism by mentioning a few remaining structures. The mandible, or lower jaw, is capable of movement in three directions: up and down, laterally, and forward and back. The up and down movement, the most important for speech, serves to regulate the size of the opening between the teeth and at the same time to influence the size and shape of the bilabial orifice and the oral cavity. The hyoid bone and the suprahyoid muscles are accessory structures in the articulatory mechanism, since they cooperate to a large extent in its action. The infrahyoid and the extrinsic laryngeal muscles support to a lesser extent the action of parts of the mechanism. The facial muscles, especially those controlling the action of the cheeks and the corners of the mouth, are also important.

The structures we have just described "articulate" the sound produced by the vibrator and reinforced by the resonator mechanisms. They are important in speech, but they also have important biological functions. As a group, they function in the food getting activities, chewing and swallowing. Many of them also take part in such important reflex actions as coughing, sneezing, hiccoughing, regurgitation, etc. When these vital functions come into conflict with language activities, it is speech that suffers.

It can readily be seen that the division of the speech mechanism into four separate parts is largely arbitrary. There is much overlapping both in structure and function. The so-called vibrator mechanism, for example, functions in part as a resonator. The resonator and articulatory mechanisms overlap even more. The mouth cavity serves at the same time as one of the most important resonating chambers and as the locus of articulation. The tongue is the most important organ in changing the shape and size of the oral cavity for purposes of resonance and it is likewise the chief articulator of the consonants. Speech is to be viewed, not as the combined result of the separate action of four mechanisms, but rather as the result of the unit functioning of one large system that operates in a coordinated and synchronized manner. We now turn our attention to the coordinating system that directs and standardizes the activity of the speech mechanism.

6. The Coordinating System

From our description of the speech mechanism, it is evident that speech is a complicated process, brought about by activities of a large portion of the body structure—activities that involve the use of large and small muscle groups in both sequential and over-lapping action. Moreover, these activities require the subordination of the more basic, vital functions of the structures used. The nervous system controlling these activities is equally complicated. We present here a brief description of this system, written primarily in terms of function rather than structure.

In terms of function, we may speak of four phases of the activity of this coordinating and supervising system: (1) the motor or activating system; (2) the sensory or reporting system; (3) the auditory or monitoring system and (4) the associating or integrating system. We must understand again that these functions do not exist independently of each other, the division merely being convenient for descriptive purposes. It represents general types of functions that can be observed in operation and that can be said to be indispensable to the normal functioning of the speech mechanism.

The motor system includes that portion of the voluntary nervous system directly concerned in the transmission of motor impulses to the muscles of the speech mechanism. These motor impulses activate the muscles to contraction, and speech is built upon the contractions so produced. The motor system begins in the precentral convolution of the frontal lobe on both sides of the brain, in that part of the cortex called the voluntary motor area. From cell bodies located in the gray matter of this area, nerve fibers pass through various structures of the brain to terminate at points of junction in those portions of the lower brain and spinal cord from which the cranial and spinal nerves that take part in speech arise. This bundle of fibers is variously designated as the voluntary motor system, the upper motor neurone system and the pyramidal system. Most of these upper motor neurones cross to the opposite side of the brain before terminating, but a small portion of those that synapse with motor neurones in the cranial nerves terminate on the same side. The termination, in each case, is a point of synapse with the cell bodies of motor nerve fibers, called lower motor neurones, that run in certain of the cranial nerves (trigeminal, facial, glossopharyngeal, vagus, spinal accessory, and hypoglossal) and in some of the upper spinal nerves. These lower motor neurones carry the motor impulses directly to the muscles of the speech mechanism. This motor system, acting in conjunction with other important brain structures, particularly the striate bodies, thalamus, medulla and cerebellum, is the immediate activator of the muscles that take part in speech.

All of the cranial and spinal nerves that function in the motor system carry also sensory neurones that report back to the brain the sensations arising as a result of the movement of the speech mechanism. These reports are of two types, one known as general sensation and comprising in this case mostly touch and pressure, the other called muscle sense or kinæsthesia. The latter type is probably the more important, since it indicates the nature and extent of the movement in muscles and joints. All of these sensory reports pass by various pathways to the opposite side of the brain where they terminate in a general sensory area in the parietal lobe, at which point they are said to "enter consciousness." We may speak of this part of the coordinating system as the sensory or reporting system. It supplies the means of knowing what has taken place and thus furnishes the basis for repetitions or modifications of the movement. It plays an important part in the coordinating process, since without it there would be no means of knowing how a given movement had been made and hence no basis for habituating it.

Up to this point, we have discussed a system for producing movement and one for reporting the nature of the movements so made. The auditory system can be regarded as a system that tests by comparison the suitability of the sounds produced by such movements. The hearing mechanism receives sound waves and transforms them into nerve impulses that pass along the auditory nerve (8th cranial) to the auditory sensory areas in the temporal lobes of the brain, where they reach consciousness. This system makes it possible for the individual to hear the speech sounds used by those about him and likewise to hear those that he himself produces. This forms the basis for a comparison and makes it possible for him to set up standards by which to judge his own speech products. The hearing mechanism thus serves as a monitoring system by means of which standards are set up, comparisons made, and speech sounds checked and modified until they conform to the standard.

The associating or integrating system is the central link in the coordinating system. Speech, we have learned, is symbolic, and it uses auditory symbols. These symbols are meaningful only when they have become connected through experience with meanings. This process, called association, resides in the auditory association area in the temporal lobe. Similar connections between visual symbols and their meanings are made in the visual association area in the occipital lobe. Thus one associative function is to tie up the symbols used in written and spoken language with meaning.

A somewhat different type of associative function, called motor association, resides in Broca's area in the frontal lobe. Broadly speaking, this area may be said to associate the speech symbol with the motor activities that lead to its production. Among other things, it provides what we may call the motor patterns for speech. More picturesquely, it contains the blueprints from which the motor system builds the finished product, speech. The nature, sequence, and timing of the movements that produce speech are laid down in this area when learned, and it is from here that the motor system receives its impulse to action. Motor association is the keystone of the coordinating system, since it bridges the gap between the motor system on the one hand and the sensory system, the auditory system, and auditory association on the other. The associative system as a whole makes possible the symbolic nature of speech by connecting the sound symbol with its meaning and with the pattern of muscle movements necessary to produce it.

In this chapter, we have shown that the speech mechanism can be divided into four units, distinct functionally, but overlapping structurally: the power mechanism, the vibrator mechanism, the resonator mechanism, and the articulatory mechanism. These various functions and structures are coordinated through the activity of the voluntary nervous system. This coordination is made possible by four types of activity carried on by the nervous system: (1) motor activity that provides the stimuli that cause muscles to contract; (2) sensory reporting that gives information as to how the movements were produced; (3) auditory monitoring that makes possible the setting up of, and conformance to, speech standards; and (4) the associative function that ties up the auditory symbol with its meaning and with the motor pattern necessary to produce it.

SECTION TWO

KINESIOLOGIC PHONETICS

Chapter 4

Introduction

In this section we take up the detailed study of specific speech sounds and the way in which they are connected in continuous speech. The approach is primarily kinesiologic. It is our purpose to describe a typical member of each phoneme as to its position and the movements of the articulatory mechanism necessary to its production. Our main interest is in the sounds of English speech, although certain foreign sounds are mentioned occasionally in order to aid in the understanding of an English sound or to clarify some phonetic principle. Although acoustic considerations are discussed in Chapter 14, it is not possible to exclude all such material from this section. Acoustic terms are used frequently, and acoustic phenomena are occasionally mentioned in connection with the description of a sound in order to tie up the movements with the auditory results.

An attempt has been made to develop and present this material in such a way as to make it seem logical and to make clear the phonetic principles involved. Consequently the treatment is somewhat different from that given in other texts. The student is advised to keep in touch with the chapter outline of this section, which will aid him in following the train of reasoning underlying the order of presentation. Some worthwhile contributions to the study of phonetics have been omitted from this section because they have been treated copiously in other texts. Usually, references are given which cover the omitted matter, and the student is urged to make liberal use of these suggested readings in order to broaden his understanding of the field.

1. A Classification of Speech Sounds

On the basis of the types of movements involved, all speech sounds may be placed in one of three divisions: continuants, stops and glides. These three types of sounds may be further subdivided on an acoustic basis as follows:

Continuants:	vowels
	continuant consonants
	nasals
Stops:	plosive consonants
Glides:	intervowel
	interconsonantal
	internasal

These categories may be defined as follows: A *continuant* is a speech sound in which the speech mechanism first takes the position typical of the sound and then, for all practical purposes, is held fixed during the period of the production of the sound. If the opening through which the air stream exits is relatively open so that friction noises are not set up around the orifice, and if the stream of air is vibrant, the resulting sound is a *vowel*. Example: [ɑ]. If the orifice is relatively small and friction noises are set up by the outflowing air stream, the sound is a *continuant consonant*. Examples: [s] and [z]. If the oral cavity is blocked at some point and the vibrant air stream allowed to exit through the nasal cavities, the resulting sound is a *nasal continuant*. Example: [m].

A *stop sound* is one in which the articulatory mechanism moves to or from a certain position that momentarily blocks completely the exit of the air stream through the oral cavity. Either the movement to the closed position, or the movement from it, or both together may call forth recognition of the sound. Example: [t].

A *glide* is a sound produced by an uninterrupted movement of the articulatory mechanism from the position of one sound to that of another. Glides may occur between vowel or vowel-like sounds, between continuant consonants or nasal sounds, in other words, between any two continuant sounds of the same category.

2. Additional Definitions

The following definitions of terms common in the field of phonetics are offered here as an aid to the student in reading this and other books on the subject:

A. *Terms Referring to Parts of the Speech Mechanism*

Maxillary. Pertaining to the upper jaw.

Mandibular. Pertaining to the lower jaw.

Labial. Pertaining to the lips.

Lingual. Pertaining to the tongue.

Dental. Pertaining to the teeth.

Rugal or Pre-palatal. Pertaining to the upper gum ridge.

Alveolar. Pertaining to either the upper or lower gum ridge.

Palatal. Pertaining to the hard palate.

Velar. Pertaining to the soft palate.

Uvular. Pertaining to the uvula, the pencil-like projection on the middle of the lower border of the velum.

Oral or Buccal. Pertaining to the mouth cavity.

Faucial. Pertaining to the narrow passage from the mouth cavity to the pharynx.

Faucial arches. The arches formed by the pillars of the fauces.

Anterior Pillars. The lingua-palatal muscles.

Posterior Pillars. The pharyngo-palatal muscles.

Pharyngeal. Pertaining to the pharynx, the cavity immediately behind the oral cavity and separated from it by the velum and the anterior pillars. The cavity is often subdivided into the naso-pharynx—the portion behind the soft palate, the oro-pharynx—the portion behind the faucial arch, and the laryngo-pharynx—the portion behind the larynx.

Nasal. Pertaining to the nasal cavity. Also used to indicate a quality of sound.

Glottal. Pertaining to the glottis, the space between the vocal folds.

B. *Terms Used to Describe Consonants*

Sibilant. Descriptive of friction noises emitted through a very narrow orifice. [s] is a sibilant sound.

Air Blade. Descriptive of friction noises emitted through an orifice that is wide horizontally and narrow vertically. [f] is accompanied by air blade vibrations.

Rolled or Trilled. Signifying the rapid fluttering of some part of the articulatory mechanism as, for example, the tip of the tongue, the uvula, or the lips. Example: trilled *r* [ř]. The modifier [ˇ] indicates a trilled sound.

One Tap Trill. A sound made with a single quick tap of the tongue tip against the teeth, rugal ridge, or anterior hard palate. Also called Flapped. Example: one tap trill *r* [ɾ].

Scrapes. A term applied to fricative sounds produced by the back of the tongue acting in conjunction with the velum or posterior pharyngeal wall.

Liquids. An older term used to designate the sounds [l], [r], [w], [j].

Long Consonant. A term applying to a consonant that is held long enough in its production to give the effect of doubling the sound without actually repeating the movements necessary to make it. Example: *this city* [ðɪsːɪtɪ̣], *come Mary* [kʌmːɛrɪ̣], *cat tail* [kætːejl]. The modifier [ː] indicates lengthening.

Affricate. A term used to designate a sound combination in which a fricative follows a plosive, both sounds being made in the same organic position. Example: [tʃ].

Aspiration, Unaspiration. These terms are usually applied to plosive consonants. An aspirated plosive is one that is followed by a puff of unvoiced air. Example: [p] as in *pat.* An unaspirated plosive is one in which no such puff of air is present. Example: [b] as in *bat.*

Fortis, Lenis. These terms mean strong and weak, respectively. They refer to the degree of muscular tension present in the articulatory mechanism and the amount of breath pressure during the production of consonants. They are commonly used in describing plosive sounds. Examples: fortis [p] as in *pay,* lenis [p] as in *upper.*

C. *Terms Used to Describe Vowels*

Pure Vowel. One made with relatively no movement of the speech mechanism during its production. Opposite in meaning to diphthong or glide.

Oral Vowel. One delivered through the oral cavity.

Nasal or Nasalized Vowel. One delivered in part through the nasal cavity.

Front, Mid or Central, Back. These terms refer to the portion of the tongue showing the point of highest arching in the production of a given vowel. Examples: front vowel [i], central vowel [ɝ], back vowel [u].

High, Mid, Low. These terms are descriptive of the degree of arching of the tongue. Thus [i] is a high front vowel. [ɛ] a mid front vowel and [æ] a low front vowel.

Close, Open, Half Close. Half Open. Terms designating the relative size of the opening between the jaws.

Rounded, Spread. Terms referring to the position of the lips in the production of vowels. [u] is a lip rounded sound in contrast to [i] for which the lips are spread.

Raised, Lowered. A vowel is said to be raised when it is made with the tongue arched higher than is typical for that sound, yet not enough higher to place it in another phoneme. For a lowered vowel, the situation is reversed.

Advanced or Fronted. A vowel is said to be advanced or fronted when the point of highest arching is farther forward on the tongue than is typical for that sound, but not enough so to place the sound in a different phoneme.

Retracted or Backed. A vowel made with the point of highest arching farther back on the tongue than is typical.

Long, Short. These terms refer to the duration of a vowel. Thus [i] is normally a longer vowel than [ɪ]. Also, a given vowel such as [ɑ] may be lengthened in certain combinations. Note the Eastern pronunciations, *father* [fɑðʒ̣] and *farther* [fɑːðʒ̣].

Tense, Lax. Terms referring to the amount of tension in the articulatory muscles. [i] is sometimes described as tense, [ɪ] as lax.

Sonority. A term descriptive of loudness or carrying power in a speech sound.

D. Miscellaneous Terms

Voiced or Sonant, Voiceless or Surd. During the production of a voiced or sonant sound the vocal folds are closed to the point of phonation. Example: [v]. During the production a voiceless or surd sound the vocal folds are not in vibration. Example: [f].

Speech Noises. A term indicating the friction sounds that accompany speech, and used in contrast to speech tones which result from laryngeal vibrations.

Central Emission. A sound is said to be centrally emitted when the orifice through which the air stream flows is centrally located in respect to the tongue and the mouth cavity. All mouth-delivered English sounds except the varieties of *l* are centrally emitted.

Lateral Emission. Sounds in which the air stream is emitted through a lateral orifice formed along one or both sides of the tongue. [l] is laterally emitted.

Retroflex. This term is used to describe sounds for which the tip of the tongue is curled upwards and backwards farther than is typical for the sound.

Nasalization. The production of a sound that should normally be free from nasal resonance with some accompanying nasality. This term is to be distinguished from the term *nasal sound* which designates a sound normally emitted through the nose.

Stressed, Unstressed. Terms referring to degree of emphasis placed on a given speech element. Changes in emphasis may result from changes in pitch, duration, or force. We usually speak of stressed or unstressed vowels and syllables but the terms can be applied to consonants as well.

Transitional Sounds. A transitional sound is one that occurs accidentally as the result of the movement from the position of one speech sound to that of another. Examples: the [p] in *something* [sʌmpθɪ̣ŋ], and the [t] in *fence* [fɛnts].

Guttural. Refers to sounds made far back in the mouth or pharynx. Also used to describe a sound quality, as a guttural tone.

Syllable. A unit of speech containing a peak of sonority and divided from other such peaks by a hiatus or a weakening of sonority.

Syllabic Consonants. Certain sounds, ordinarily considered as consonants, may upon occasion form syllables by themselves without an accompanying vowel. The sounds that are not usually syllabic in English, but may become so, are [m] and [n]. Examples: *chasm* [kæzm̩] and *button* [bʌtn̩].[1]

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[1] *l* and *r* are also given by many phoneticians as examples of consonants that may become syllabic. In this book these two sounds are treated as glide sounds that may, if made as continuants, be used as vowels, either stressed or unstressed. Strictly speaking, *city* [sɪtɪ̣] is as much a syllabification of [j] as *buckle* [bʌkḷ] is of [l].

3. THE NEUTRAL POSITION

We have mentioned previously the need for some landmark or position of the mechanism to use as a constant factor in describing speech sounds. We have chosen for this purpose the position of the speech mechanism in ordinary, quiet respiration. This we have called the neutral position (Fig. 10).

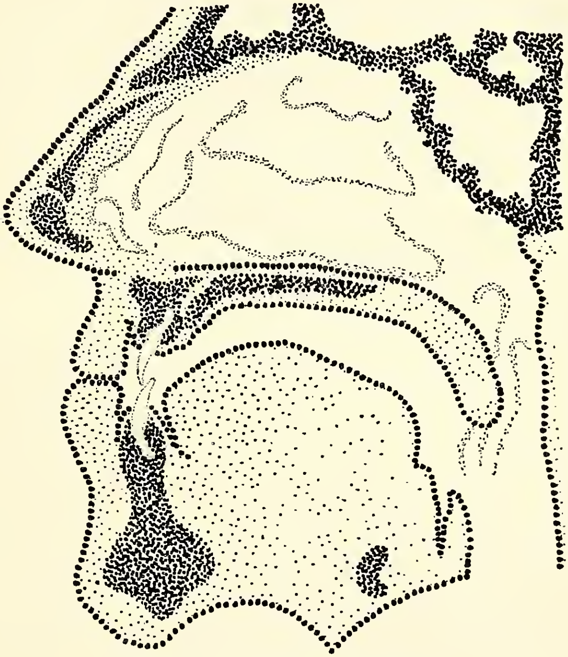

FIGURE 10.—The neutral position.

The neutral position may be described as follows: The vocal folds are open, permitting the free passage of air. The exact extent of the opening varies with changes in the force of respiration, but the vocal folds are never closed to the point that friction noises are set up as the air stream passes through the glottis. The port into the nasopharynx is open, the soft palate hanging relaxed and pendant. The tongue lies passively in the floor of the mouth. Its dorsal surface is convex from end to end, and from side to side. The tip and sides of the tongue lie in loose contact with the inner surfaces of all the lower teeth, thus filling opening completely the lower part of the mouth cavity. The medium fissure produces a slight depression running along the midline from front to back. The external oral orifice is closed, the upper and lower lips meet in a light contact. The line of junction is usually approximately horizontal, with perhaps a slight upward turn at the middle and a little downward turn at the two sides. The amount of red lip margin showing and the external appearance of the two lips varies in different individuals. The mandible is depressed slightly by the force of gravity, thus bringing the upper edges of the lower incisors about on a level with, and slightly posterior to, the lower edges of the corresponding teeth of the maxilla. With the mandible in this position, the mouth cavity is practically obliterated by the tongue, the dorsal surface of which reaches almost to the hard and soft palates. The larynx and hyoid bone are in their resting positions, these positions being determined by the counterbalancing effect of the tonic contractions of the antagonistic muscles that control their movements. In fact, all of the muscles of the speech mechanism may be described as in a position of rest, i.e., that position which results when the muscles are reacting only to those impulses that are necessary to maintain muscle tonus.

Although the neutral position described above was chosen more or less arbitrarily, there are good reasons why this particular position was the logical choice. In the first place, as mentioned previously, it represents the normal resting state of the speech mechanism. The muscles controlling the mechanism approach relaxation more nearly than in any other position that could be described. It is a relatively stable position and the one assumed by the mechanism between periods of activity. From a physiological standpoint it is thus the logical choice for our study.

In the second place, a number of speech sounds are produced by relatively slight changes of this neutral position, as for example, the consonant sounds [m], [b], [p], [v], [f] and the neutral vowel [ʌ] (see Figs. 71, 58, 38, and 11). All of these sounds will be described in detail later; for the present we may simply say that another reason for the choice of the neutral position described above is that it is closely related to a number of important English speech sounds and thus furnishes an excellent starting point for the analyses that follow.

Although probably unnecessary, it might be well to add one last word of caution in order to avoid any possible misunderstanding. It must not be thought that ordinary speech is a series of isolated sounds with the articulatory mechanism starting from, and returning to, the neutral position for the production of each sound. On the contrary, speech is the result of a series of movements, each one of which is not only built upon the preceding movement, but is also modified somewhat by the nature of the movement to follow. The concept of the neutral position and its use in the analysis of isolated speech sounds is an arbitrary method of study made advisable by the fact that it offers the only suitable approach to the problems that we are attempting to solve. Our procedure in the description of speech sounds will then be to specify for each the modifications of the neutral position that are necessary to produce the sound.

4. THE RESONATED LARYNGEAL TONE AS THE ACOUSTIC BASIS OF SPEECH

From a physiological standpoint the whisper is perhaps the basis of speech, since it is the type of sound that is produced with the least expenditures of effort, requiring only a partial closure of the vocal folds. From an acoustic standpoint, however, such whisper sounds are so lacking in carrying power and flexibility that they would make a very poor basis for a language. We may safely say that the laryngeal tone set up in the vibrator mechanism and resonated in the resonating cavities is the acoustic basis of speech.

It is easily seen that only one change in the neutral position is necessary to produce a laryngeal tone—an approximation to the point of phonation by the vocal folds. If this is done in conjunction with the action of the power mechanism, the rest of the speech mechanism remaining in the neutral position, a humming through the nasal cavities resembling the sound [m] will be produced. It is but a short step from this activity to the production of the vowel sounds. Note that we have begun here with the neutral position and made one modification, an approximation of the vocal folds, to produce a resonated laryngeal tone. With this as a point of departure, we are now ready to consider the further modifications of the neutral position necessary to produce the various vowel sounds.

Chapter 5

The Vowels

1. General Remarks

The authors realize that the problems which arise in connection with any study of vowel sounds are almost innumerable. In the discussions that follow, we have tried to adhere as closely as possible to the main purpose of this particular study, which is to describe sounds in terms of movements, and to point out general phonetic principles.

The movements involved in the production of vowel sounds are subject to even more variation than those for consonants. The x-ray studies of Parmenter and Trevino (previously mentioned on page 29) indicate, however, that the variations within any one individual, and even those from one individual to another, are not so great as to constitute essential differences in the nature of the movement. Strictly speaking, it is as a matter of fact inaccurate to say that exactly the same sound can be produced by a variety of methods. It is more correct to say that each variation in movement produces a slightly different sound, but that as long as the sound remains in the phoneme under consideration, we are not ordinarily conscious of the differences.

Vowel phonemes are delimited by auditory judgment more than by the nature or extent of the movement; hence resonance, pitch, and duration are important factors. Consonant sounds are much more definite as to position, but there is no sharp dividing line between vowels and consonants. For example, the sounds [m], [n], and [ŋ] have considerable vowel quality, and [l], [r], [w], and [j] are often classified as semi-vowels although they are not so defined in this book. The distinction between consonants and vowels is made on an acoustic basis. Each sound, except the nasals, is delivered through an oral orifice of a certain size, and it would be possible to arrange these sounds in order from [s], the one with the smallest orifice, to [ɑ], the one with the largest opening. As long as the opening is small enough that friction noises are produced by it when the air stream passes through, the sound is, by definition, a consonant. When the opening becomes large enough that friction noises are not produced, the sound is classified as a vowel. Looked at in this way, it is evident that there will be, in the middle of the series of orifices, some that will be on the borderline between the vowel and consonant ranges. The corresponding borderline sounds are difficult to classify, since they have both vowel and consonant qualities.

The number of vowel phonemes to be differentiated depends upon the fineness of the distinctions made. The number is limited by the auditory mechanism and not by the neuromuscular mechanism. The speech mechanism is capable of producing an almost unlimited number of slightly varying vowel tones, but *the number of these sounds that can be used in speech for symbolic purposes is limited by the ability of the auditory mechanism to recognize them as separate sounds when they are employed in the communicative process*. Note the connection between this statement and the phoneme theory previously discussed. In English we ordinarily assign separate symbols to sixteen vowel phonemes. These vowels are described in the succeeding pages. The procedure in each case is to describe the typical movements of the jaw, lips, and tongue that occur when these sounds are pronounced in isolation. All descriptions are made in comparison with the neutral position.

Two modifications of the neutral position that remain constant for all the vowels may be mentioned here in order to avoid repetition. The first, closure of the vocal folds to the point of phonation, has already been mentioned. The second is the closure of the port into the nasopharynx. There seems to be some question as to whether the closure of the soft palate is always complete, or whether in some cases it may remain partially open.[1] For our purposes we are safe in assuming that the integrity of all the English vowels depends upon the ability to elevate the soft palate and draw forward the pharyngeal walls so that the opening into the nasopharynx is almost, if not completely, closed. Descriptions of the sixteen vowel phonemes follow.

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[1] J. P. Kelley, "Studies in Nasalty," *Archives of Speech*, Vol. I, No. I, 1934. M. D. Steer and J. Tiffin, "A Photographic Study of the Use of Intensity by Superior Speakers," *Speech Monographs*, Vol. I, No. I, 1934.

2. The Neutral Vowel [ʌ] as in Up [ʌp]

This is called the neutral vowel because it is the vowel that is made most easily from the neutral position. [ʌ] is produced by dropping the mandible approximately 12 mm.[2] and directing the voiced air stream through the oral cavity (Fig. 11). The opening of the bilabial orifice is effected as the lower lip follows passively the depression of the mandible. No movement of the tongue is necessary for this sound, although typically the central portion may be raised slightly. [ʌ] is the lowest of the so-called central vowels.

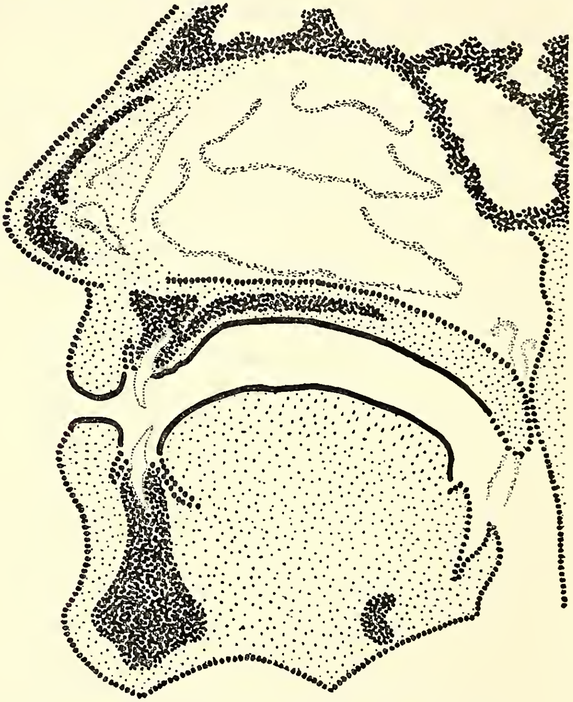

Figure 11.—The position for the neutral vowel, [ʌ].

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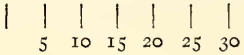
[2] This measure represents the distance between the upper and lower jaws, as measured from upper incisors to lower incisors. It varies widely in different individuals and in different combinations. Throughout this discussion of the vowels, this figure must be taken as typical or suggestive rather than absolute. For the convenience of the reader, the scale below is marked off in millimeters.



Many phoneticians regard [ʌ] as the stressed form of [ə], or vice versa. They regard the two sounds as identical in position, the difference being entirely a matter of stress. Other phoneticians describe a slight difference in the tongue position for the stressed [ʌ] as against the unstressed [ə], [ə] having a slightly higher, and perhaps slightly farther forward, tongue position. It has seemed to the writers that neither of these conceptions of [ə] quite gives the entire picture, though both are partially true. Consequently a full discussion of [ə] is given later. (See page 83.)

The position for [ʌ] is not fixed and hence it cannot serve as an absolute standard of reference. Like other vowels, and perhaps even more so than some, [ʌ] varies in different combinations and with different individuals. The variation away from a strictly neutral position is usually in the direction of a slight arching and retraction of the central portion of the tongue. However, if the vocal folds are in vibration, the soft palate closed, and the jaw dropped slightly, the result will be a sound, like [ʌ], and it is probable that most people actually produce the [ʌ] in this way, with little or no active movement of the tongue. For all practical purposes we can speak of [ʌ] as the neutral vowel. It is chosen as the starting point for this discussion of the vowels because it so closely approximates the neutral position, and because it can be used conveniently to mark the beginning of three series of tongue movements that include all English vowels except perhaps [ʟ], which needs to be described separately. One series, in which the movements of the tongue are essentially upward and forward, includes the front vowels. The second, in which the movements are backward and upward, includes the back vowels. A third, in which the movements are a continuation of the upward movement of the central part of the tongue, includes the central vowels.

It has long been customary to present the vowel system of a language in some sort of diagram. Such diagrams aim to represent more or less accurately the position of the tongue for each of the vowels placed in the picture. Various shapes have been used for this diagram, including triangles, parallelograms and parabolas. The vowel diagram that has enjoyed the most popularity in recent years is reproduced here in its conventional shape.

In this drawing the position [i] represents the highest and farthest forward and [a] the lowest and farthest back points of arching of the *front* of the tongue in the normal production of English vowels. Similarly, [u] represents the highest and most retracted and [ɑ] the lowest and most forward point of arching of the back of the tongue. Other vowels are then put in their proper places on the diagram in accordance with their tongue positions. The central vowels occupy the middle part of the figure.[3] This scheme of representation, while graphic, has its disadvantages in that it implies much too definite positions for the various vowels. The researches of G. O. Russell[4] have tended to discredit such vowel diagrams and to indicate that they create a misleading picture of the tongue positions. Even if the diagram is presented with reservations, still the very definiteness of the picture tends to make one visualize the vowels as occupying fixed and unvarying positions. This is definitely not the case.

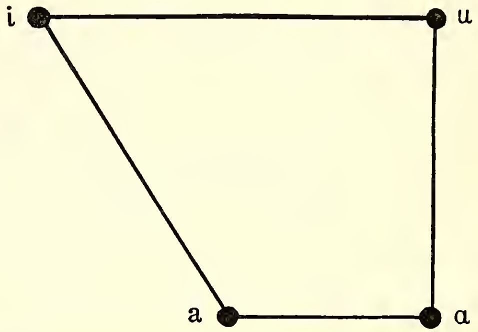


FIGURE 12.—The conventional vowel diagram. See also Figures 18 and 25.

Nevertheless, since there are advantages to a pictorial representation of the vowel system, the writers include such a diagram (Fig. 13), which is essentially the vowel parallelogram with the corners smoothed into curves. An attempt has been made to make the drawing seem less definite and more suggestive, in an effort to avoid the danger of reading too much into the diagram as a picture of actual tongue positions.

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[3] The reader is referred to Ward's *The Phonetics of English.* For a more detailed discussion of the vowel diagram, see p. 65 ff.

[4] *The Vowel, Speech and Voice.*

The vowel [ʟ] is omitted because it cannot be represented with any accuracy in a picture of this type.

It must be emphasized again that this diagram is not intended to represent exactly the tongue positions for the various vowels. In so far as it is physiologically schematic at all, it is representative of *types* of position and *directions* of movement. The neutral vowel position is represented by [ʌ], a central vowel. From this position, the front vowel series (see Figure 14), [a] to [i], develops as the front of the tongue arches progressively higher and farther forward. The back vowel series (see Figure 15) from [ɒ] to [u] involves, in general, an upward and backward movement of the back of the tongue. For the central vowels (see Figure 16), [ʌ] to [ɝ], the central portion of the tongue arches successively higher. The position for [ɑ] is extremely variable but with most people it is probably a central vowel characterized by a tongue placement flatter than the neutral position. It is so presented in this diagram. Up to this point, we have described the position of the vowel [ʌ] and indicated the general directions of the movements from this neutral tongue position for the formation of the remaining vowels. We may resume our description of specific vowels by taking up next the [ɑ] sound.

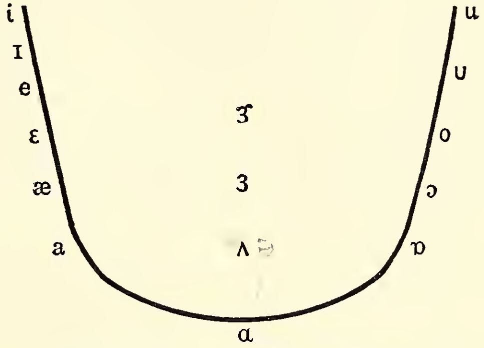

Figure 13.—A schematic vowel diagram.

3. [ɑ] as in Father [fɑðɝ̣]

Lips: Open wide. The bilabial orifice is formed almost entirely by the depression of the mandible. The sound can be produced without any activity on the part of the lips. Ordinarily, the lips are open wider for [ɑ] than for any other sound.

Mandible: Depressed about 17 mm. The mandible is depressed farther for [ɑ] than for any other sound.

Tongue: From the neutral position, the tongue is usually somewhat lowered, lying approximately flat in the floor of the mouth cavity. We have mentioned previously that the tongue position for [ɑ] is extremely variable. The variations are usually in the direction of a retraction of the whole tongue and a slight elevation of its back portion. For most people, however, [ɑ] is a central vowel made with the tongue relatively flat in the mouth. Thus, it is the lowest of the central vowel series. Its tongue position is very similar to that for the neutral vowel [ʌ] except for a certain amount of active flattening. The two sounds are likewise close together acoustically, the difference being largely due to the increased size of the oral resonator and bilabial orifice for [ɑ]. The most important essential for [ɑ] seems to be a large unobstructed resonator in the oral cavity with a large orifice. [ɑ] is frequently placed in vowel diagrams as the first of the back vowel series, and it should be recognized that the sound is often made with the back of the tongue slightly raised, thus making it part of this series.

4. [a] AS IN CLASS [klas][5]

This sound is the lowest of the front vowel series. Acoustically the phoneme lies between [æ] and [ɑ]. It is approximately the sound of *a* in French *la*.[6] The position for this sound frequently forms the starting point for such glides as [aj] in *high* [haj] and [aw] as in *allow* [əlaw].[7] It is also used frequently as a compromise between [æ] and [ɑ] in such words as *after*, *shaft*, *bath*, *fast*, etc. This use is fairly common in the East and appears to be spreading elsewhere.

Lips: Open widely but not spread. Although the lip muscles may play a slight role in opening the orifice, this is accomplished mainly by the depression of the mandible. This sound could be produced without any activity of the lips. The lip position is the first of a series for the front vowels in which the general direction of the movement is toward closing and spreading.

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[5] This word is also pronounced as [klæs] and [klɑs].

[6] The special symbol [ɐ] is sometimes used to represent this sound when it occurs finally in Spanish and Italian. It is slightly unstressed with something of the quality of schwa.

[7] [ɑ] is even more commonly used as the starting point for such glides, especially in Middle Western speech. The exact vowel used as starting point is subject to a great deal of sectional and individual variation.

Mandible: The mandible is depressed about 15 mm. The lower jaw is depressed farther for this sound than for any of the front vowels. The jaw movement for the rest of the series is toward the closed position.

Tongue: The tongue position varies for this sound. As usually made, [a] belongs with the front vowels and should be placed at the beginning of the first series of movements. The tongue as a whole is drawn slightly forward and upward from the [ʌ] position. The tip of the tongue is flattened and raised slightly so that it lies in contact with the lower front teeth. The dorsal surface of the forepart of the tongue is somewhat concave from side to side, whereas the remaining portion is convex. The central portion of the tongue is arched upward toward the hard palate. The point of greatest elevation is toward the posterior third of the hard palate, but the elevation is not pronounced. [a] is the lowest and farthest back of the front vowels. The next vowel in the forward series is [æ]. With some speakers, [a] is produced so that it is closer to [ɑ] both in sound and in movement than it is to [æ].

5. [æ] as in At [æt]

Lips: The initial opening of the lips is probably due to an active contraction of the muscles concerned in this movement. Beyond that, the lips follow passively the depression of the mandible. The orifice is similar in shape to that for [a] and slightly smaller in size. Typically there is a very slight retraction of the angles of the mouth, although this movement is not essential.

Mandible: The mandible is depressed approximately 13 mm., slightly less than the downward movement for [a].

Tongue: The tongue movement continues the upward and forward movements begun for [a]. The tongue is drawn a little farther forward and elevated a little higher. The sides of the tongue are in contact with the inner borders of the upper molars and with a small strip of the corresponding lateral portions of the hard palate. The forward movement of the tongue has the effect of increasing the size of the back cavity formed between the back of the tongue and the soft palate. In addition, there may be a slight depression of the back of the tongue.

6. [ɛ] as in Ever [ɛvɝ̣][8]

Lips: Open to form an orifice similar to that for [æ], but not noticeably narrower in its vertical extent. A retraction of the angles of the mouth is definitely present for this sound.

Mandible: Depressed approximately 8 mm.

Tongue: The central elevation remains about the same as for [æ]. However, the front of the tongue moves upward and forward from the [æ] position, while the back moves forward and slightly down. The tip of the tongue is spread and concave from side to side, as in [a]. The sides of the tongue are in contact with the molar teeth and the corresponding lateral portions of the hard palate as in [a]. So far as movements from the neutral position are concerned, [ɛ] is essentially a continuation of the same movements that were begun with [a] and continued in [æ].

7. [e] as in Vacation [vẹkejʃən]

Lips: Open, with the angles of the mouth retracted to form an orifice slightly smaller than that for [ɛ].

Mandible: Depressed approximately 6 mm.

Tongue: In producing this sound, the tongue continues its upward and forward movement from the position for the neutral vowel [ʌ]. The back of the tongue is drawn still farther forward and downward. The central portion of the tongue arches higher toward the hard palate and the point of highest elevation is anterior to that for [ɛ]. The front of the tongue is drawn still higher forward and upward. It is still slightly concave from side to side. The sides of the tongue are now in contact with the teeth and corresponding lateral portions of the hard palate, as far forward as the second premolars. The sides of the forepart of the tongue touch the upper teeth as far forward as the canines. Some phoneticians state that the tongue muscles as a whole are tense for [e] and lax for [ɛ].[9] [e] seldom occurs in English as a definitely pure vowel, though it does in other languages, notably French. In English the sound is usually glided toward the [i] position to form the glide sound [ej]. It is, however, a relatively pure sound when it occurs in unaccented positions.

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[8] A vowel lying somewhere between [æ] and [ɛ] is heard frequently in such words as *air*, *carry*, *Mary*, *hair*, etc. Many speakers feel that they do not say [kærɪ̣], nor yet [kɛrɪ̣]. It may be that a separate symbol is needed to represent this in-between sound. However, in narrow transcription, the sound can be represented by a raised [æ] or a lowered [ɛ], thus: [kæ˔rɪ̣] or [kɛ˕rɪ̣].

8. [ɪ] AS IN IT [ɪt]

Lips: Open to form an orifice slightly smaller and more retracted at the angles of the mouth than that for [e].

Mandible: Depressed approximately 4 mm.

Tongue: The back of the tongue remains practically the same as for [ɛ]. The arching of the central portion of the tongue is also similar to that for [ɛ], except that the point of highest elevation is farther forward. The front of the tongue is also raised higher for [ɪ] than [ɛ]. The contact of the sides of the tongue with the hard palate extends forward about as far as the first premolars.

9. [i] AS IN EAT [it]

Lips: Open to form an orifice elongated from side to side and narrow in its vertical extent—slightly narrower than that for [ɪ] (Fig. 19).

Mandible: Depressed about 3 mm.

Tongue: This is the highest of the front vowel series. The whole front of the tongue is elevated farther than for any previous vowel. The arching is greater, the tongue almost touching the hard palate. The point of highest elevation is farther forward, somewhat anterior to the central portion of the hard palate. The contact made by the sides of the tongue with the lateral portions of the hard palate is similar to that for [ɪ] except that it extends farther centrally, thus leaving only a narrow central orifice for the passage of the air stream. The forward and downward movement of the back of the tongue is considerably greater for [i] than for [ɪ]. In these front vowels, however, it is the movement of the front of the tongue that is important. We may assume that the positions taken by the back of the tongue are largely the results of its passive following of the movements of the front. Whatever their cause, these movements serve to form a posterior mouth cavity that increases in size at the same time that the anterior mouth cavity is decreasing. It is thought that the ratio in size between these two cavities, formed by the elevation of the central portion of the tongue, is important in determining the acoustic quality of the various front vowels. The vowel [i] is sometimes characterized as tense in contrast to [ɪ] which is called lax.

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[9] See J. Kenyon, *American Pronunciation*, p. 62.

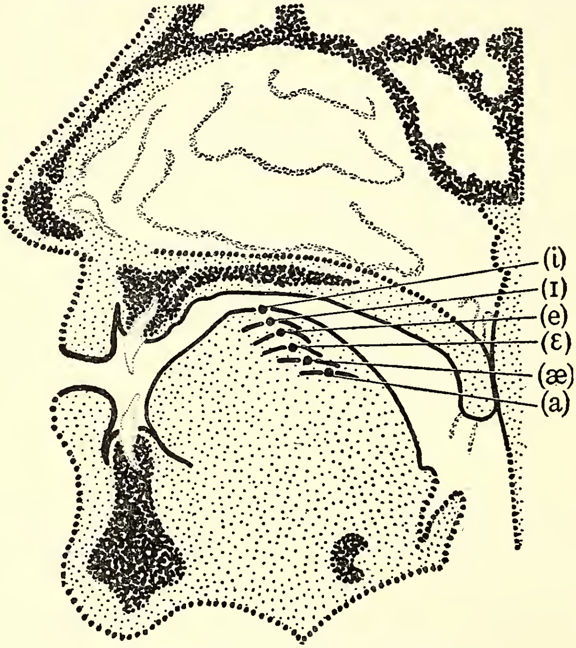

Figure 14.—The front vowel series.

10. [ɒ] as in Not [nɒt][10]

Acoustically, this sound lies between [ɑ] and [ɔ]. It occurs commonly in England, frequently in the Eastern part of this country, and occasionally in other sections. [ɒ] is the first of the back vowel series. With this sound the tongue starts the upward and backward movement that culminates in the [u] position. The mandible closes progressively from the wide open [ɑ] position, and the bilabial orifice becomes successively smaller and more rounded for the remaining back vowels.

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[10] This word is often pronounced [nɑt].

Lips: Approximately the same as for [ɑ] except that they may be slightly rounded. This lip rounding is not essential, and may or may not occur as a movement accompanying the production of the sound.

Mandible: Depressed slightly more than for [ɑ].

Tongue: The tongue position for [ɒ] lies between that of [ɑ] and [ɔ]. It is usually closer to [ɑ], and the tongue position can best be described as similar to that sound, except that the tongue is drawn farther backward and upward.

11. [ɔ] AS IN LAW [lɔ]

Lips: Open wide and slightly rounded by drawing the angles of the mouth medial-ward. The lips may or may not be slightly protruded.

Mandible: Depressed approximately 17 mm.[11]

Tongue: In assuming the position for [ɔ], the movements of the tongue show a continuation of the backward and upward movements from the neutral position. The whole tongue is further retracted, and the forepart shows an additional depression. The back of the tongue, on the other hand, shows an additional elevation and retraction.

12. [o] AS IN OBEY [ọbej]

In American English, [o] ordinarily serves as the starting point for the glide sound [ow] and seldom occurs as a pure vowel. The tendency of the sound to glide toward the [u] position is especially evident when it occurs finally or between two consonants, as in *show* [ʃow] or *boat* [bowt]. In some instances, usually when the sound is in an unstressed syllable, it is very nearly a pure vowel, as in *opinion* [ọpɪnjən].[12]

Lips: Open and rounded, with noticeable protrusion.

Mandible: Depressed about 12 mm.

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[11] The depression is about the same as that for [ɑ], but the position of the lips gives this sound an entirely different discharging orifice.

[12] A variety of [o], called the "New England short *o*," Dialect Atlas symbol [ɵ], is sometimes heard in such words as *home*, *whole*, *coat*, etc. It is variously described as a shortened, unrounded [o], and as a rounded [ʌ].

Tongue: In comparison with [ɔ], the front of the tongue is still further depressed, while the back shows an additional elevation and retraction toward the soft palate.

13. [ʊ] AS IN BOOK [bʊk]

Lips: Open, rounded and protruded. The orifice is customarily smaller than that for [o].

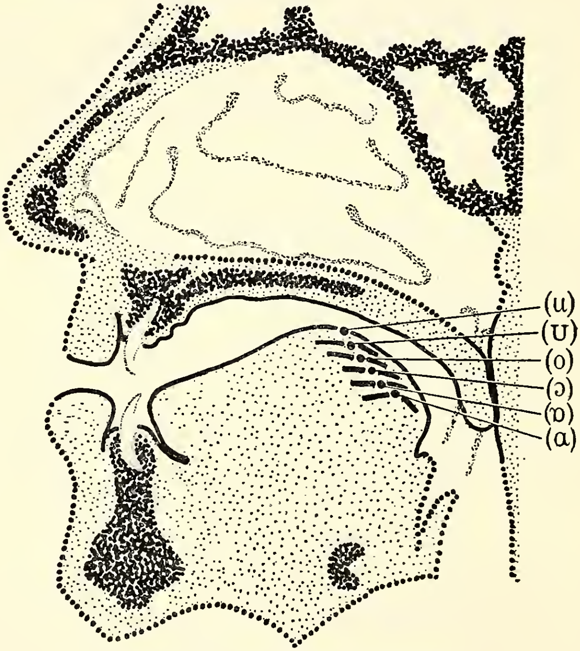

FIGURE 15.—The back vowel series.

Mandible: Depressed approximately 9 mm.

Tongue: The tongue position for [ʊ] appears to represent a break in the continuity of the series of movements present for the back vowels. The front of the tongue is higher and farther forward for [ʊ] than for [o].[13] The back of the tongue has also moved forward and the point of highest elevation is approximately the same height, but farther anterior. The movement from the neutral position is of the same type as that for the rest of the back vowels, but the tongue position for [ʊ] appears to regress slightly instead of containing the upward and backward series.

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[13] See the x-ray pictures of these sounds as presented by Trevino and Parmenter in the *Quarterly Journal of Speech*, June, 1932, pp. 351–369.

14. [u] AS IN BOOT [but]

Lips: Open, rounded, and protruded. The orifice is smaller than for [ʊ]. The degree of rounding and protrusion is greater for this sound than for any other vowel (Fig. 20).

Mandible: Depressed approximately 5 mm.

Tongue: The sound is the highest of the back vowels. The front of the tongue is depressed and retracted beyond the position for any vowel yet considered. The back of the tongue is elevated and retracted until only a narrow orifice is left between it and the soft palate. This position represents the limit of upward and backward movements for this series of vowels. It will be observed that for this series it is the movement of the back of the tongue that is important. The front of the tongue retracts and lowers more or less passively as it follows the movements of the back.

15. [ɜ] AS IN EARLY [ɜlɪ̣][14]

This sound is one of the central vowels, and belongs to the third series mentioned at the beginning of this discussion. There are four phonemes in the central series if we include [ɑ]. [ɑ] is the lowest of the series, the tongue lying approximately flat in the mouth, [ʌ] is usually made with the tongue in the neutral position; [ɜ] lies between [ʌ] and [ɝ], which is the highest of the series and is made with the tongue well arched upward in its central portion.

Lips: Open to form an orifice similar to that for [ʌ]. In some individuals there may be a slight spreading, in others a slight rounding.

Mandible: Depressed approximately 9 mm.

Tongue: Ordinarily the whole of the tongue, including both front and back, is raised slightly from the neutral position, with an additional elevation of the central portion. The tip of the tongue is spread and lies behind the lower front teeth. Palatograms show the sides of the tongue in contact with the teeth and corresponding lateral portions of the hard palate as far forward as the second premolars, leaving, however, a wide central orifice for the passage of the air stream.

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[14] As this word is pronounced in Eastern and Southern speech.

16. [ɝ] AS IN EARLY [ɝlɪ̣][15]

Lips: A bilabial orifice similar in shape to that for [ɜ] is formed. It is, however, noticeably smaller (Figs. 21 and 22).

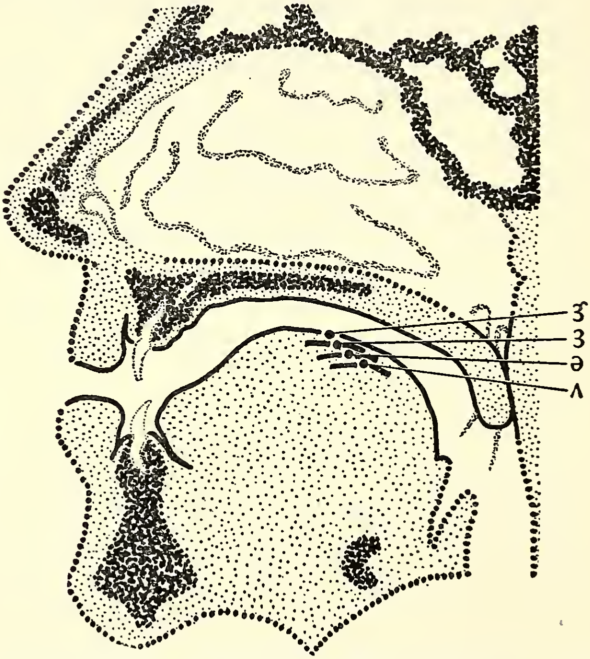

FIGURE 16.—The central vowel series. The position for [ə] is purely arbitrary. See the discussion of schwa vowels in the succeeding pages.

Mandible: Depressed approximately 7 mm.

Tongue: The tongue position for [ɝ] varies greatly in different individuals. Typically the sound is produced by a slight retraction of the whole tongue and a decided elevation of its central portion, thus making it the highest of the central vowel series. This position is usually considered as the "correct" position for the sound, since the vowel so produced is judged as more "pleasant" acoustically than some other varieties of [ɝ]. Another variety of [ɝ] is produced by a decided retraction of the whole tongue and a bunching and elevation of the front of the tongue. The amount of elevation may vary considerably, and in some instances the front of the tongue may be curled backward toward the hard palate. This latter position produces the so-called "burred" *r* which is usually considered an unpleasant sound. It is this variety of the [ɝ] phoneme in Middle Western speech that is usually found most objectionable by those living in other sections of the country. As we shall see later, the *r* phoneme contains many varieties of sounds, usually considered as consonants. [ɝ], however, because it is a continuant sound of some length, and because it is produced through an orifice large enough to prevent the formation of friction noises, is generally grouped with the vowels and called a vowelized *r*. We have followed Kenyon in using the symbol [ɝ] for this sound instead of the older [ɚ]. The symbol [ɚ] was also conventionalized by Kenyon at an earlier date because the I.P.A. has no symbol for this vowel. [ɝ] is to be used when the vowelized *r* occurs in stressed syllables, [ɝ̩] in unstressed.

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[15] As in the usual General American pronunciation.

17. [ʟ] AS IN TITLE AND BUCKLE [tɑjtʟ̩] [bʌkʟ̩]

We have mentioned previously that the vowelized form of the *l* sound does not fit into any of the three series of movements described above. This is because the sound is emitted laterally. It is the only sound in English that is correctly produced in this manner. The sound of *l* occurs most commonly in a consonantal, or, as we shall prefer to call it later, a glide form. It is, however, frequently syllabic, that is to say it forms a separate syllable by itself. Because this syllable-forming power is usually considered as an attribute of vowels only, and because in its syllabic form the sound is a continuant with definite vowel qualities, we classify this one variety of the *l* as a vowel. The sound of *l*, like that of *r*, is subject to considerable variation, but it is customary to distinguish only two main varieties. They are also called front *l* and back *l*, respectively, in terms of the position of the tongue for their production (Figs. 23 and 24).

Lips: The lips are opened slightly to produce a bilabial orifice similar to, but smaller than, that for [ʌ].

Mandible: Depression is variable but limited.

Tongue: For front *l*, [ʟ], the tongue is drawn forward and the tip elevated so that it is in contact with the alveolar ridge behind the upper incisors, while the sides of the forepart touch the inner borders of the canines and premolars. The sides of the back of the tongue are depressed so that they do not lie in contact with the teeth. The dorsum of the tongue is elevated somewhat in its central portion but the posterior part is approximately in the neutral position, or it may be slightly depressed. The movements of the tongue block the central part of the mouth cavity so that the air stream is emitted laterally on both sides, that is, it is forced out between the upper and lower molars, to pass outward between the cheeks and the alveolar ridges, finally emerging from the bilabial orifice. As [ʟ] is usually pronounced, there are no appreciable friction noises, and the sound is identified on the basis of resonance factors. Consequently, it is classified as a vowel. Some varieties of [ʟ], however, may be accompanied by definite friction noises.

Practically the only difference between front *l* and back *l* is in the position of the tongue. The contact of the tongue tip with the anterior hard palate is farther posterior for [ᴌ][16] than for [ʟ]. The middle of the tongue is convex for [ʟ] and slightly concave for [ᴌ], and the back of the tongue is elevated toward the [u] position. This causes the lateral discharging orifices to be considerably farther posterior for [ᴌ] than for [ʟ]. In both, however, the sound is laterally emitted. In fact, the acoustic effect of *l* depends upon this lateral emission of the sound. We may correctly think of a series of *l* sounds produced through a corresponding series of tongue positions with the discharging orifices anywhere along the line from front to back. For descriptive purposes, phoneticians usually consider only two of this series of *l*'s, the front [ʟ] and the back [ᴌ]. The position of the vowel *l* will be determined largely by that of the preceding sound. Preceding sounds made with the front of the tongue tend to pull the [ʟ] forward, whereas back sounds cause it to be formed farther back.

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[16] The symbol [ʟ] is used in broad transcription to indicate any of the varieties of vowelized *l*. In close transcription [ʟ] is used to indicate a front or clear *l* and [ᴌ] a back or dark *l*. These two symbols will suffice for ordinary narrow transcription. The Dialect Atlas Society, however, uses a series of symbols to represent slight shades of difference between *l*'s varying all the way from an extremely clear to an extremely dark *l*.

The *l* vowels described thus far are typical sounds that are present in everyone's speech, the variation between front and back varieties depending upon the influence of neighboring sounds. In addition, we should mention the clear or extremely fronted *l* and the dark or retracted *l*. Clear *l* occurs regularly in Southern and Eastern speech in certain positions. This sound is made with the tongue tip far enough forward that it comes in contact with the upper front teeth. Dark *l* is more common among Middle Westerners. As its name indicates, it is made with the tongue retracted beyond the typical position for a back *l*. Dark *l* is closely related to, and often confused with, [o], whereas clear *l* has more of an [ɪ] resonance. Vowelized *l* seldom occurs in English except in unstressed syllables. Consequently, in transcription it is usually written as [ʟ̣]. However, such words as *milk* and *bulk* are occasionally pronounced in such a way that the only vowel present seems to be a sort of stressed *l*, thus: [mʟk] and [bᴌk].

18. The Schwa[17] Vowels [ə] as in About [əbɑwt], Battalion [bətæljən], Telephone [tɛləfown]

We have previously discussed 15 vowels that have more or less sharply delimited phonemes. Each sound is subject to some variation, but the variation is relatively limited and the sounds are easy to distinguish. The [ə] phoneme, on the contrary, is very large and contains many gradations of sounds. The [ə] phoneme serves, as it were, as the dumping ground for all of the variations caused by unstressing in each of the other vowel phonemes, wherever these sounds have strayed so far from their own sound families that they are no longer recognized as belonging to them. The presence of this phoneme, as well as its large size, is due to two factors: first, the fact that English is a language containing many unstressed syllables, and second, the fact that the mechanism, particularly in glide movements, often falls short of giving a certain vowel its full value.

[17] The term is of German origin. It has somewhat the same general meaning in that language and has been used by a number of English and American phoneticians.

As an illustration of the first factor, note the following pairs of words:

battle [bætḷ]	*battalion* [bətæljən]
con'tract [kɒntræ̣kt]	*contract'* [kəntrækt]
able [ejbḷ]	*ability* [əbɪlɪ̣tɪ̣]
illustra'tion [ɪləstrejʃən]	*illus'trative* [ɪ̣lʌstrətɪ̣v]

In each of these pairs, a given vowel has one value in the stressed syllable and another in the unstressed position. Thus in *battle*, the first vowel is definitely [æ]. However, in *battalion*, the sound is unstressed and it becomes a *schwa* vowel. Now this unstressed [æ] will vary greatly in its pronunciation by different individuals. In some cases the sound of the first vowel in *battalion* will be very near to the [æ] itself, in others it will be made practically in the [ʌ] or neutral position, and there will be all shades of gradation between these two extremes. However, we can safely say that no one can place the accent definitely on the second syllable of the word and still produce a clear-cut [æ] in the first. We may define unstressing, then, as the tendency of vowels in unaccented positions to migrate toward the neutral position. Notice the word *toward*. The migration may reach the neutral position or it may stop anywhere along the line. Referring once more to the above list of words, note that there may be considerable difference between the schwa vowels in the words *battalion*, *contract'*, *ability*, and *illus'trative.* They all have this one element in common, that what were once clear cut vowels or glides, i.e., [æ], [ɒ], [ej] and [ej], respectively, have migrated toward the neutral position. Obviously, the [ə] phoneme must be large to accommodate all of these sounds. Let us give a few other illustrations. *Milk* is sometimes pronounced [mɪlk] and sometimes [mɪək]. *Better* may be either [bɛtɝ̣] or [bɛtə]. Note the unstressed sounds in *telephone*, *capable*, *potato*, *vegetable*, etc.

We are now ready to make some general statements concerning the schwa vowels. First, we may say that any of the 15 vowels described above may move toward the neutral position to such an extent that they are no longer clear-cut representatives of their own phonemes but have become schwa vowels. Second, the schwa phoneme is very large because of the variation in the extent of the migration toward the neutral position, and because of the fact that each vowel approaches it from a different position and thus carries with it some of its own characteristics (Fig. 17).

It should now be clear why this section was headed "the schwa vowels" and also why we have not been willing to call [ə] the unstressed equivalent of [ʌ]. The vowel [ʌ] is, in a sense, a stressed schwa, if this is not too much of a paradox. It is the schwa made nearest to the neutral position and stressed. However, since [ʌ] occurs so frequently and is a relatively stable vowel in its own right, we might better consider it as a distinct vowel phoneme lying near the neutral position. The vowel [ə], on the other hand, has no typical position. It represents a tendency rather than a position, a tendency of vowels to lose their identity by moving toward the neutral position. Perhaps Figure 17 will serve to clarify this whole discussion.

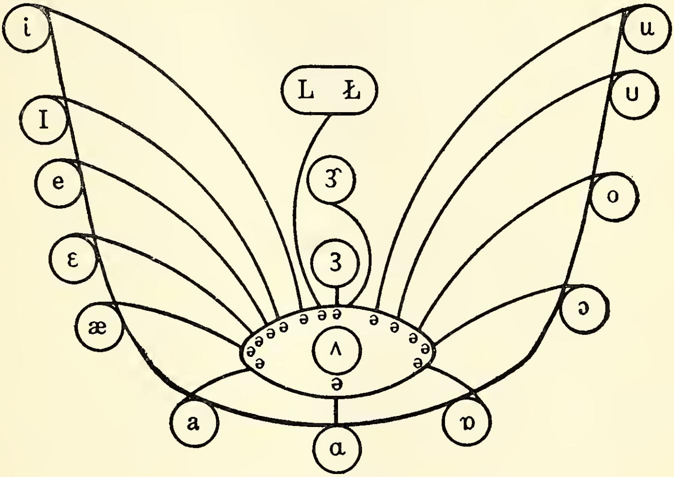

FIGURE 17.—The schwa vowels.

We have reproduced here, with slight modifications, the vowel diagram given earlier in these pages. The circles around the vowels indicate that these symbols represent phonemes subject to considerable variation. The *l* phoneme has been arbitrarily placed in the drawing for the sake of completeness, but it must be remembered that its position on the diagram is in no way indicative of its tongue position, nor is it possible to represent pictorially the lateral emission of the sound. The large egg-shaped area surrounding the neutral vowel [ʌ] represents the schwa vowel area. The lines drawn from the various vowel phoneme areas indicate graphically the tendency of all these sounds to approach the schwa area when they occur in unstressed positions. Since [ʌ] is already in the neutral position, it perforce becomes one of the schwas whenever it is unstressed. In English, unstressing is generally in the direction of the schwa vowel area. However, it may upon occasion be in other directions, even to the extent of reversing the trend. The main pull is that of physiological inertia, which tends to make the mechanism return to the neutral position. However, other forces are also in operation, probably the chief one being the influence exerted by neighboring sounds. What finally happens to the unstressed vowel will be the result of the summation of these various forces.

We may now speak briefly of the problems involved in symbolizing these schwa vowels. One of these is knowing just when a given vowel in its movement toward a central position leaves its own phoneme and enters the schwa area. There is no rule to determine this, and the only test is an acoustic one. For example, the word *amplitude* in the writer's speech is unquestionably [æmplətɪud]. Some, however, pronounce it over-carefully as [æmplịtɪud] and others as [æmplịtɪud]. Now, if the word is pronounced definitely in one of these three ways, there will be little difficulty with its transcription. If, however, the sound is not definitely either [i] or [ɪ] or [ə] but a sound somewhere between [ɪ] and [ə], one can only listen carefully and use his best judgment.

This leads to the inevitable conclusion that the transcription of unstressed vowels must necessarily be clumsy because the [ə] phoneme covers such a large area, unless we adopt some new modifying sign to be used in broad transcription to indicate a sound midway between a given vowel and a schwa. The writers suggest, and have used in this book, a dot placed under the vowel to indicate partial unstressing. This affords three refinements of distinction in approaching this problem of symbolization. Thus in a given word such as *address*, if the pronunciation of the first vowel is definitely [æ], we would write [ædrɛs]. This would indicate approximately level stress on both syllables, since both [æ] and [ɛ] are represented as receiving full vowel value. But if the first vowel is definitely unstressed to a schwa vowel, we can write it as [ədrɛs]. This implies that the stress is on the second syllable. However, if the first vowel is neither [æ] nor [ə], but something in between, we write [æ̣drɛs]. In this case, the vowel has started its migration toward the schwa vowel area but has gone only part way. It has some of the characteristics of [æ] and some of [ə], yet to use either of these symbols is a misrepresentation. The use of the dot in this manner to indicate partial unstressing is logical, and is so employed in the *Century Dictionary*.

One further item should be mentioned in connection with the schwa vowels. It is obvious that those vowels on the diagram that are nearest to the neutral vowel [ʌ] will have the most tendency to move into the schwa area when the vowel occurs in an unstressed position. On the other hand, the vowels that are farthest away from the neutral position, [i] and [u], tend to unstress first to [ɪ] and [ʊ], respectively, but if the unstressing is continued either may become [ə]. The word *city* offers an excellent example. It is occasionally pronounced as [sɪtị], but generally the last vowel is unstressed to [sɪtɪ̣]. One might say that there is little likelihood that this unstressing will ever continue to [ə]. Note, however, *citified*, which is often [sɪtəfɑjd]. Likewise, the word *Missouri* as spoken by some individuals ends in [i], with others it ends with [ɪ] or [ɪ̣] and still others [ə].

19. SUMMARY OF THE VOWEL SOUNDS OF ENGLISH

(1). *General Remarks.* Several general observations may be made on the basis of this survey of the positions taken by the articulatory mechanism in the production of the various vowel sounds. In the first place, it should be noted that the exact movements of the tongue are still difficult to describe, even with the aid of all the information obtained from studies by x-rays, palatograms, and direct observation. Such descriptions must be more or less general, partly because of the variation that exists, and partly because the movements are exceedingly difficult to view in their entirety. The gross movements have been described above, but there may be fine gradations of movement which our present technique does not uncover. Furthermore, other factors besides movement are important in giving the vowels their characteristic quality. Some of the differences between vowels may be partly or largely a difference in duration. The degree of tenseness or laxness of the tongue and of the muscular walls of the mouth cavity and pharynx also influences vowel quality.[18]

In the second place, it is difficult to lay down specific minimum essentials for the production of a given vowel, since the factors involved are apparently relative rather than absolute. A change in the position of the front of the tongue may be compensated for by an adjustment of the back of the tongue, or a difference in the amount of depression of the mandible may be offset to a certain extent by a difference in the position of the lips, etc. One can only say that certain movements usually accompany the production of a given vowel, and that, while the general nature of the movement may be essential and remain a constant factor, it is subject to many variations.

Lastly, it seems evident that many of the vowels are produced by essentially the same type of movement and involve substantially the same muscles in different degrees of contraction. As mentioned previously, this section has been limited to a consideration of the movements of the lips, mandible, and tongue. Our next step will be to summarize, as far as these structures are concerned, the general requirements of the vowel sounds.

(2). *Summary of Lip Movements* (Fig. 18).

Vowels [ʌ], [ɑ], [a], [ɜ], [ɝ], [ʟ], [ə], and, with most speakers, [æ]: What might be called a passive bilabial orifice is formed for these sounds. No special movement other than that of opening is required. Usually, the initial part of the opening movement is produced by an active contraction of the depressors of the lower lip and the elevators of the upper lip, but for the most part the opening is effected as the lower lip follows passively the depression of the mandible.

Vowels [i], [ɪ], [e], [ɛ] and with a few speakers [æ]: In addition to the opening movement, various degrees of spreading accompany these sounds. This involves a retraction of the angles of the mouth so as to produce an orifice elongated from side to side and relatively narrow in its vertical extent.

Vowels [ɒ], [ɔ], [o], [ʊ], and [u]: In addition to the opening movement, these sounds are typically accompanied by various degrees of protrusion and rounding of the lips.

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[18] G. O. Russell, *Speech and Voice*, Ch. VIII.

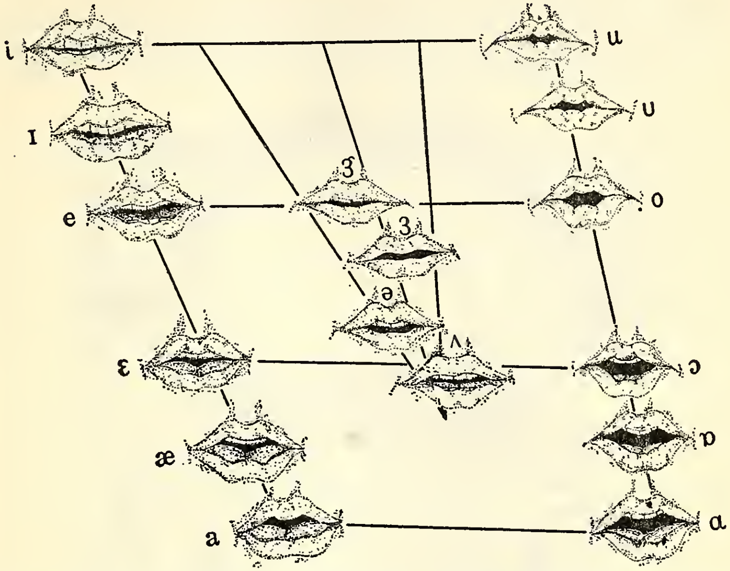

FIGURE 18.—The lip positions for the vowels of English. The vowels are here arranged on the conventional vowel diagram. [ə] is pictured as if it were a stable vowel in its typical position.

(3). *Summary of the Movements of the Mandible.* The mandible is depressed in varying degrees for all vowels normally made. The amount of depression for any given vowel may vary within wide limits without seriously affecting the character of the sound. The mandible is depressed to the greatest extent for the vowel [ɑ]. It closes progressively for the front vowel series ending in [i] and the back vowel series ending in [u]. The openings for [ɜ] and [ɝ] are approximately the same as for [ʌ].

(4). *Summary of Tongue Movements.*

Vowels [a], [æ], [ɛ], [e], [ɪ], and [i]: The essential movements of the tongue involved in the production of these sounds are as follows: forward movement of the whole tongue; depression of the back of the tongue; elevation of the tip and forepart of the tongue, and an additional arching upward of the central portion of the tongue. The point of highest elevation moves successively anterior for the various sounds in the order given from [a] to [i].

Vowels [ɒ], [ɔ], [o], [ʊ], and [u]: The production of these sounds depends upon the ability of the individual to execute the following tongue movements: retraction of the whole tongue; elevation of the back of the tongue; and depression of the front of the tongue. These three general movements are essential to all the sounds, while the relative extent of the various movements determines the particular sound that will be produced.

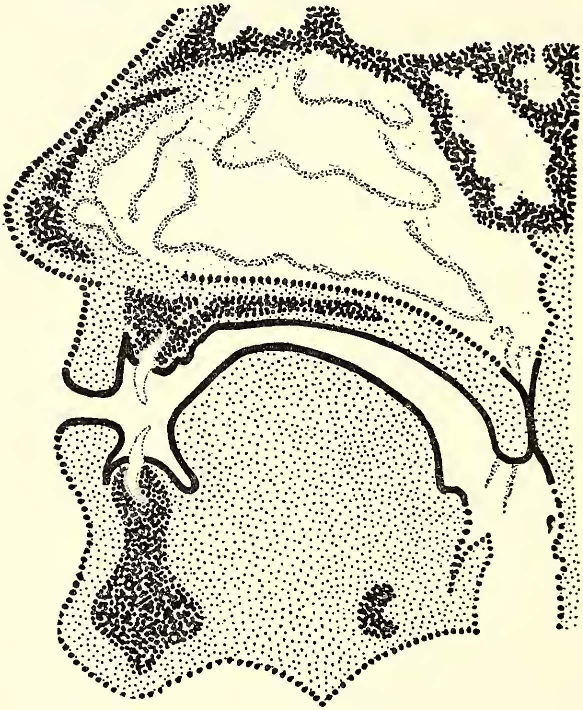

FIGURE 19.—The position for [i].

Vowels [ɑ], [ʌ], [ɜ], and [ɝ]: [ʌ] has been described as the neutral vowel since it is made in, or close to, the neutral position. Typically, it is probably made with a slight raising of the central portion of the tongue, whereas for [ɑ] the tongue is flattened. With [ɜ] and [ɝ], the essential movement is a definite elevation of the central part of the tongue. This elevation may be accompanied by a non-essential drawing forward or retraction of the whole tongue. As indicated above, [ɝ] may also be made with the tip of the tongue elevated and retracted.

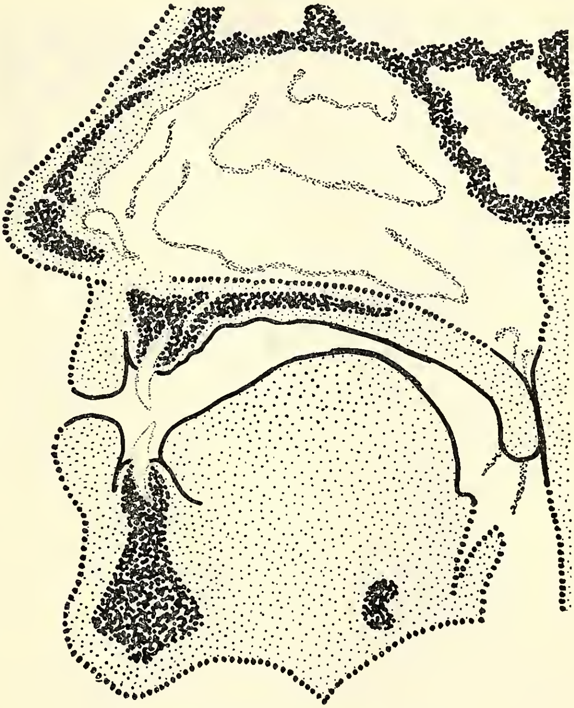

FIGURE 20.—The position for [u].

The vowels [ʟ] to [ᴌ]: The essential movement for these sounds is an elevation of some portion of the tongue to form an occlusion with the hard palate at the midline, at the same time that the sides of the tongue are depressed, allowing the air stream to escape laterally.

(5). *Long and Short Vowels.* The matter of vowel length or duration, sometimes called "vowel quantity," is rather complicated. We need to remember first that these terms are not equivalent to the customary dictionary description of certain vowels as "long" or "short," e.g., short *a* (ă) and long *a* (ā). As used in the study of phonetics, vowel duration means the actual length of time occupied by the utterance of a given vowel. In the second place, we need to keep clearly in mind that there are two aspects of vowel duration: (1) certain vowels are characterized by the fact that they are typically and rather consistently shorter than certain other vowels; and (2) all vowels vary greatly in duration, depending upon the context in which they are used, the dialect spoken, the mood of the speaker at the moment, and the amount of stress used.

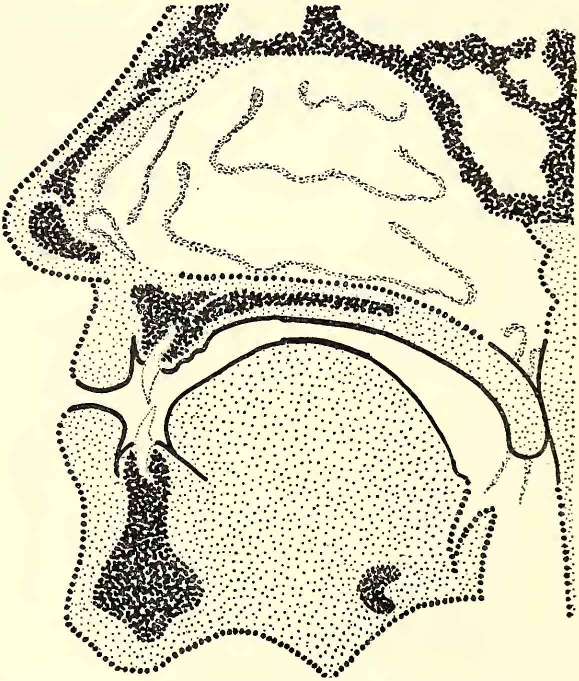

FIGURE 21.—A typical position for [ɝ]. See also Figure 22.

Concerning the first of these aspects of vowel duration, we can say that the vowels [i], [a] [ɑ], [ɔ], [ɜ] and [ɝ] are usually relatively long as compared with the vowels [ɪ], [e],[19] [ɛ], [æ], [o],[19] [ɒ], [ᴜ], [ʌ] and [ʟ]. In any specific utterance, of course, a vowel described as short might actually be longer than one described as long. However, as they are typically produced in connected speech, the vowels in the first list are characterized by shortness and those in the second by relatively greater length. The variable aspect of vowel duration in relation to context, stress, and other factors is more difficult to reduce to specific statements. Kenyon[20] lists four rules that apply to the factors of stress and position: (1) "The same vowel, if stressed, is longer when final or before a voiced consonant than it is before a voiceless consonant"; (2) "The same vowel, if stressed, is longer when final or before a final consonant than it is when followed by an unaccented syllable"; (3) "The

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[19] As a pure, or relatively pure, vowel.

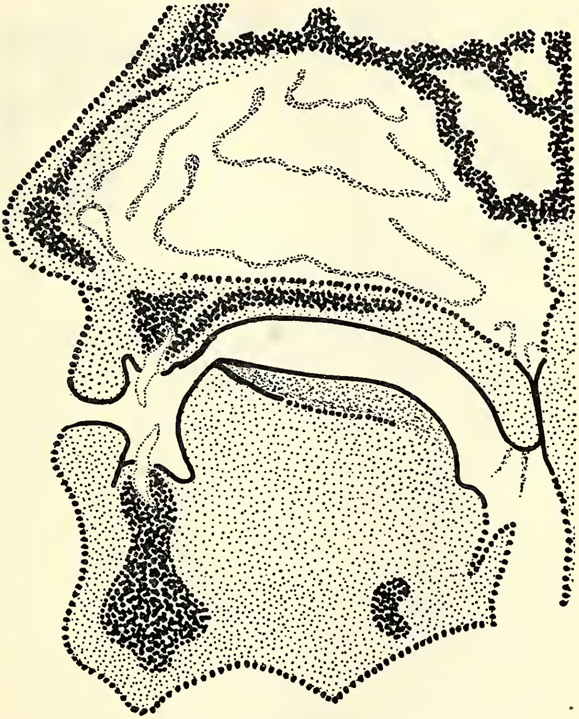

FIGURE 22.—A high front tongue position for [ɝ].

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[20] *American Pronunciation*, pp. 65–68. In the quotation given, bold faced type in the original is here printed in regular type, phonetic symbols are in brackets rather than in bold face type, and the word "plus" has been substituted for the plus sign.

same vowel, if stressed, is longer when followed by a sonorant [m], [n,] [ŋ], [l] plus a voiced consonant than it is when followed by a sonorant plus a voiceless consonant"; and (4) "The same vowel becomes longer or shorter as its stress is increased or decreased."[21]

(6). *Tense and Lax Vowels.* Certain vowels are customarily produced with the musculature somewhat more tense than is the case with other vowels. In the second edition of his book,[22] Kenyon describes the vowels [i], [e], [ɝ], [ɜ], [ɔ], [o] and [u] as tense in contrast to the lax vowels [ɪ], [ɛ], [æ], [ɑ], [a], [ʌ], [ə], [ɒ] and [ʊ]. In a later edition,[23] he describes [i], [e] and [u] as tense in contrast to [ɪ], [ɛ] and [ʊ]. He goes on to say,

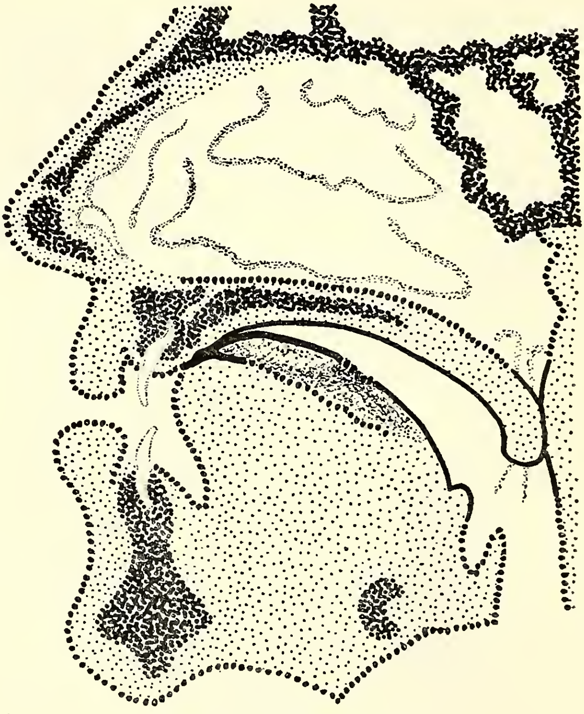

FIGURE 23.—The position for [ʟ].

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[21] For a more detailed discussion of vowel duration, see Webster's *New International Dictionary*, 2nd Ed., Par. 49, p. xxxi.

[22] *American Pronunciation*, 2nd Ed., 1926, pp. 88–124.

[23] *American Pronunciation*, 6th Ed., p. 62.

"The difference in tenseness is less certain for the lower vowels. No English vowels are so tense as some of the French and German vowels, and the present author does not regard the distinction by tenseness and laxness as being so important as the difference in the height of the tongue."

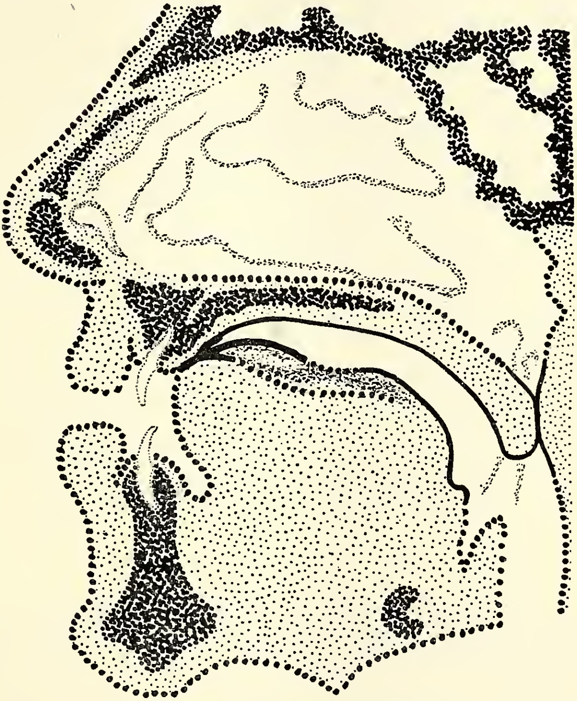

FIGURE 24.—The position for [ɪ].

(7). *The Five Key Vowel Positions* (Figs. 11 and 19–24). Five vowel positions are important because they indicate types of tongue movement, and because they represent extremes of movement in certain directions. We have called the vowels made in these positions *key vowels*. They are: [ʌ], the vowel made in, or nearest, the neutral position (see Fig. 11); [i] the vowel representing the usual limit of the movement toward a high front position; [u], the vowel representing the usual limit of the movement toward a high-back position; [ɝ] representing the limit of the movement toward a high-central position; and [ʟ], the high-central, laterally emitted vowel. We will have occasion to refer to these five key vowel positions again, especially in discussing glide sounds.

(6). *The Development of New Phonemes in the Back Vowel Series.* It is interesting to note in passing that there appears to be a tendency in the English language to develop new sound phonemes among the vowels made with the tongue held low in the mouth. We may call attention first to the increasing use of the [a] sound which is intermediate between [æ] and [ɑ]. This marks the beginning of a tendency to make new distinctions in that general region. A second phoneme, [ɒ], between [ɑ] and [ɔ], has been gradually creeping into the language. This sound is by no means new, but it is of comparatively recent development, and its present use seems to be spreading. Webster's latest *New International Dictionary*, in its table of diacritical markings, also describes an additional sound lying between [ɔ] and [o] and sometimes occurring in such words as *soft*, *cloth*, etc. It is symbolized in diacritical markings by ŏ̂. Other observers have commented on an increasing use of dark *l*. Taken all together, these items indicate a tendency to add new phonemes of the type that require an additional refinement of the movements of the back of the tongue.

20. THE CARDINAL VOWEL SYSTEM

The English phonetician, Daniel Jones, is the originator of a system of standard vowels called the "Cardinal Vowels."[24] It must be clearly understood in the beginning that these vowels are not intended to represent vowels actually used in speech (although in some instances they do approximate vowels present in certain languages), nor are they meant to serve as models in a system of standard speech. The Cardinal Vowel system grew out of a desire for a standard of measurement to facilitate the analysis and description of the vowels used in a given language or by a given speaker.

There are eight primary cardinal vowels, established arbitrarily as follows: cardinal [i][25] is the highest and farthest front *vowel* sound that can be made, the lips being spread. Cardinal [ɑ] is made with the tongue lowered and retracted as far as possible, the lips being unrounded. Cardinal vowels [e], [ɛ] and [a] are front vowels chosen to form a uniform *acoustic* sequence between cardinal [i] and cardinal [ɑ]. The cardinal vowels [ɔ], [o] and [u] are back vowels that continue the equidistant series up to the highest and most retracted back sound that will still be a vowel.

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[24] See Daniel Jones, *An Outline of English Phonetics*, pp. 31–38. (The writers have based their discussion of the cardinal vowels upon the description given by Jones in this book.) See also Ida Ward, *The Phonetics of English*, pp. 52–59.

After these eight cardinal vowels had been selected and standardized in this manner, x-ray photographs were made of their production. The resulting pictures form the basis of the cardinal vowel diagram (Fig. 25). The cardinal vowels have also been recorded by Jones and these records are available[26] for purposes of study and comparison.

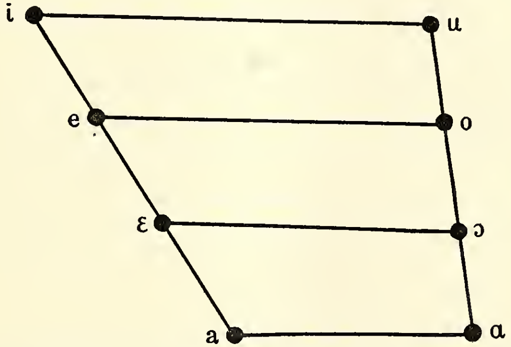

FIGURE 25.—The cardinal vowel diagram. Only the primary cardinal vowels are shown here.

The reader is warned that the cardinal vowels cannot be learned adequately by means of written descriptions or x-ray pictures of tongue positions. They must be learned "by ear," preferably under the tutelage of some one thoroughly acquainted with them, or, if this is not possible, from the cardinal vowel records. After the cardinal vowels have been mastered, they can be used as standard points of reference in describing any vowel in any language.[27] For example, the typical English [i] is lowered and retracted from the position for cardinal [i], whereas the sound of [i] in the French word *si* is very close to the cardinal vowel.

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[25] Note that the symbols are the same as those for vowels in regular usage. Care must be taken in speaking and writing to add the word "cardinal" whenever a cardinal vowel is intended.

[26] No. B 804, published by the Gramaphone Co., 363 Oxford Street, London, W.

Daniel Jones also describes certain secondary cardinal vowels derived from the eight primary vowels, as follows: cardinal vowels [y] and [ø] by adding close lip rounding to cardinals [i] and [e], respectively; cardinal vowels [œ] and [ɒ] by adding open lip rounding to cardinals [ɛ] and [ɑ], respectively, and cardinal vowels [ʌ], [ɤ] and [ɯ] by adding lip spreading to cardinals [ɔ], [o] and [u], respectively. Cardinal [ɨ] is a lip spread sound, and cardinal [ʉ] a lip round sound, made half-way between cardinals [i] and [u].

21. Symmetrical and Asymmetrical Vowels

We have previously observed that the front vowels of English are characterized by various degrees of lip spreading, ranging from the bilabial orifice for [i], which is spread horizontally and narrowed vertically to a considerable degree, to the orifice for [a], which is usually neither spread nor rounded, but neutral. Similarly the back vowels in English are characterized by various degrees of lip rounding. Such a vowel system, in which front vowels are spread and back vowels are rounded, is said to be a symmetrical system. Conversely, a vowel system that contains rounded front vowels or spread back vowels is said to be asymmetrical. Individual vowels are also spoken of as symmetrical or asymmetrical depending upon their conformance to this system. The symmetrical and asymmetrical pairs for the front and back vowels are given in the columns below:

front vowels		*back vowels*	
Symmetrical (*Spread*)	*Asymmetrical* (*Rounded*)	*Symmetrical* (*Rounded*)	*Asymmetrical* (*Spread*)
i	y	u	ɯ
ɪ	ʏ	ʊ	ʊ̲
e	ø	o	ɤ
ɛ	œ		

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[27] See Ida Ward, *Phonetics of English*, pp. 60–108, for examples of such comparisons.

The asymmetrical vowel [y] is formed by making an [i] with the lips rounded, [ʏ] is rounded [ɪ], [ɯ] is spread [u], etc. Although English formerly contained asymmetrical vowels,[28] they no longer exist, except in accidental situations. In some languages they occur regularly as separate phonemes. For examples, German uses [y], [ʏ], [ø] and [œ] and French has [y], [ø] and [œ].[29]

22. NASAL VOWELS

Any vowel sound can be nasalized by lowering the soft palate and allowing a part of the air stream to exit through the nose. In French, however, four vowels are regularly nasalized when they occur in certain situations. These vowels are [ɑ̃], [õ], [ɛ̃] and [œ̃]. Examples: *quand* [kɑ̃], *dans* [dɑ̃], *garcon* [garsõ], *sont* [sõ], *bien* [bijɛ̃], *fin* [fɛ̃], *un* [œ̃] and *chacun* [ʃakœ̃]. The nasal [õ] is sometimes represented as [ɔ̃]. The actual sound seems to lie between the two. There is considerable difference between the acoustic effect of these nasal vowels in French and the same sounds as nasalized by a careless American speaker. The difference is difficult to analyze. It may consist of differences in duration, tension and degree of nasality, the French nasals being usually shorter, more tense and seemingly more completely nasal.

23. A VIEW OF THE REMAINING SPEECH SOUNDS AS METHODS OF INITIATING OR TERMINATING VOWELS

In this discussion we first considered the neutral position of the speech mechanism and the minor modifications of that position necessary to produce the neutral vowel [ʌ]. We next pointed out how further modifications of the neutral position, involving movements in three general directions, produce the four types of vowels: the front, the back, the central, and the laterally emitted. We have discussed each of these vowels in some detail. Lastly, we have spoken of the tendency of all of these vowels to move toward the neutral position when they occur in unstressed syllables, thus producing the group of schwa vowels symbolized by [ə]. These vowel sounds, all of them symbol units, form the basic material out of which speech is made.

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[28] Kenyon, *American Pronunciation*, p. 63.

[29] Some phoneticians add to the foregoing list [ʌ] and [ɑ] as the unrounded forms of [ɔ] and [ɒ] respectively, thus making [ʌ] and [ɑ] asymmetrical vowels. While this adds to the completeness of the system, it seems to stretch unduly the physiological facts in the case.

Clearly, however, a speech limited to the vowel sounds would be quite inadequate to carry the complex meanings that modern language is called upon to convey. There are two chief reasons for this inadequacy: first, there are not enough symbol units upon which to base a complicated language; and second, the vowels are difficult to join together if their integrity as separate symbol units is to be retained. It was thus inevitable that other types of speech sounds would arise to remedy these two deficiencies. It is an interesting, as well as a clarifying, approach to the remaining speech sounds if we consider them simply as methods of initiating and terminating these basic vowel sounds. *This approach is the basis for the order of presentation of the remaining material in this section.* We will discuss, in order, the various methods by which these vowel sounds are started and stopped or otherwise modified. Some of these methods will result in sounds that are symbol units. Others will produce transitional sounds usually present in speech but without symbolic significance. We turn our attention first to modifications of the vowel sounds produced by the action of the laryngeal mechanism.

Chapter 6

Laryngeal Modifications of the Vowels

It seems logical to start a discussion of the methods of initiating and terminating vowels by considering those modifications of vowel tones that can be produced in the larynx. In discussing the vibrator mechanism we described four type positions that the vocal folds are capable of taking: open, closed to the whisper position,[1] closed to the point of phonation, and completely closed. These positions are the basis of three methods of approaching and terminating vowel tones.

1. THE GLOTTAL FRICATIVE APPROACH OR TERMINATION, SYMBOL [h] AS IN HAT [hæt]

If, with the articulatory mechanism set in the position for [ɑ], the vocal folds pass from the open position through the whisper position, simultaneously with the exit of the air stream, the vowel will be preceded by the escape of a certain amount of unvoiced air accompanied by friction noises (see Figs. 3, 4 and 7). The result is written phonetically as [h]. This is the glottal fricative or *h* approach. It has its basis in the fact that there is a certain range in the approximating movements of the vocal folds where they are close enough to produce friction noises but not voice. In this approach, the articulatory mechanism is always pre-set for the vowel. It is the breath impulse and the whisper vibrations preceding the vowel that give the effect of [h]. Compare for example: *at hat*, *eat heat*, and *it hit*. The prominence of [h] depends upon two factors[2]—the air pressure below the glottis and the speed of the glottal closure. An increase in sub-glottal pressure or a decrease in the speed of closure serves to make the sound more prominent. This means that a series of *h*'s can be produced, varying all the way from one that is barely perceptible to one that is greatly exaggerated. This is easily demonstrated by observing how easy it is to vary the duration and amplitude of the *h* approach.

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[1] Other factors enter into the production of the whisper, but we have limited our discussion here to the action of the vocal folds which is the important factor in producing what we think of as an *h*.

[2] This is true only insofar as the vocal folds are concerned. It may be that supra-glottal constriction also plays a part in increasing the prominence of the [h].

There are, then, as many positions of the articulatory mechanism for [h] as there are sounds that can be approached by this method. In the words, *heat, hit, hat, hot, hut, hoot* and *hurt*—[hit], [hɪt], [hæt], [hɒt], [hʌt], [hut], and [hɝt]—the *h* is produced through seven different positions. [h] has no articulatory position of its own; it always takes the position of the succeeding vowel. It follows that any attempt to produce an *h* in isolation will succeed only in producing the voiceless analogue of some vowel or vowel-like sound. One can, however, distinguish a voiceless [ɑ] from a voiceless [hɑ]. This would indicate that there is more to [h] than simply the friction noises set up when the vocal folds pass through the whisper position. This factor is largely the breath impulse, i.e., the escape of a large amount of air when the vocal folds pass from the open to the whisper position. [h] is not a voiceless vowel. It is the acoustic result of the change from an open position of the vocal folds to a much closer one, usually one that actually produces sound vibrations.

Although [h] has been, and still is, considered by some writers as a distinct sound, it is now generally recognized that it is not a sound entity in itself, but merely a method of approaching other sounds. It is, however, a symbol unit; its presence or absence in certain combinations changes the meaning of the symbol. Thus *eight* has a different meaning from *hate*, *ail* from *hail*, and *ill* from *hill*.

There is also a glottal fricative termination to vowel sounds in which the movements described above occur in reverse.[3] That is, at the completion of the production of a vowel, the vocal folds pass from the vibrating position back to the open position, with the result that friction noises are again set up. This glottal fricative termination is not acoustically significant unless it is exaggerated. It has no symbolic meaning. It is interesting to note that when recordings of sound combinations such as [tɑ], [pɑ] etc. are played in reverse, the results often sound much like [hɑt] and [hɑp], although the *h* ending is not observable when the record is played in the normal sequence. This would seem to indicate that we use the glottal fricative termination to vowels more frequently than we would think. It might also indicate that we are psychologically set to hear initial *h*'s because they carry meaning, but we fail to hear the final ones because they have no significance. There is of course also the possibility that an initial *h* is actually physiologically easier to hear than a final one.

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[3] Some phoneticians describe also a so-called voiced *h*, I.P.A. symbol [ɦ]. This sound is said to occur under certain conditions between two vowels as in *ah ah* which might be [ɑɦɑ] or [ɑhɑ]. Physiologically, a voiced *h* is a paradox, but the effect of *h* might be given acoustically by a diminution of the volume of a vowel almost to the point of hiatus, followed by a rather rapid increase in volume. Also, it may be that the sound described as a voiced *h* is a regular [h] made with so little breath pressure and so rapid a closure of the glottis that the sound is barely perceptible. Thus, when the words *see him* [si hɪm] are spoken more and more rapidly, it becomes increasingly difficult to decide whether or not the *h* is present. Eventually, the pronunciation becomes [sim]. In connection with our discussion of laryngeal modifications,

We should mention also those instances in which the [h] occurs between vowels as in *a hail storm, go home,* etc. Here the [h] serves to link the two vowels, and could be considered either as a glottal fricative termination to the first vowel or a glottal fricative approach to the second vowel. In the examples given, it seems more reasonable to think of the [h] as a method of approach to the second vowel.

2. THE GLOTTAL VIBRATORY APPROACH OR TERMINATION (NO SPECIAL SYMBOL)

We have said that if the vocal folds pass from an open to a vibrating position during the passage of the air stream, an *h* will be produced. On the other hand, if the air stream is arrested momentarily while the vocal folds are moving into the vibrating position, voicing will begin simultaneously with the outward passage of air, and without any preliminary breath impulse. We have called this manner of initiating vowels the glottal vibratory approach. It has no special symbol. In transcription, if no other symbol precedes that for the initial vowel, it is assumed that the glottal vibratory approach is indicated.

The essential difference between the glottal fricative and the glottal vibratory approaches is, then, a matter of the timing of the movements

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it is interesting to note the various ways in which these two words can be linked by laryngeal action. They are: [si hɪm], [si ʔɪm], [si ɪm], [si əm], [si m̩ː] and [sim].

of the vocal folds in relation to the movements of the out-flowing column of air. If this column is already in motion when the vocal folds move to the vibrating position, an [h] results; if it does not begin to move until the folds are already in position, the tone is initiated without the preliminary puff of air that characterizes the fricative approach. A laryngoscopic study[4] of the action of the vocal folds indicates that the glottal vibratory approach is usually accomplished by bringing the folds together before the air stream starts and then releasing the contact just enough so that when the air stream starts vibration can be initiated immediately, without any definite explosion and without any escape of unvoiced air.

The glottal vibratory termination operates according to the same principles. If, at the close of phonation, the air stream is checked at the instant the vocal bands open, there is no acoustic effect. This is the glottal vibratory termination. On the other hand, if the stream of air continues to flow during the opening movement, the glottal fricative termination results. We have commented previously that what appears to be a glottal vibratory *ending* is usually heard as a glottal fricative *approach* when a record of the sound is played in reverse. The glottal vibratory termination is probably used infrequently. Normally, it is indistinguishable from the fricative termination.

3. THE GLOTTAL PLOSIVE APPROACH OR TERMINATION, SYMBOL [ʔ]

In this approach, the air stream is dammed up momentarily below the glottis by a complete closure of the vocal folds. The glottis is then opened quickly, allowing the air stream to escape suddenly and producing an explosive effect (Fig. 6). This is the glottal explosive approach to a vowel sound. The intensity of the sound can be varied by increasing or decreasing the amount of air pressure exerted on the closed glottis just before its opening. When used as a method of termination, the vocal folds move from the vibrating to a completely closed position, thus stopping suddenly the voiced air stream. This is the glottal implosive termination. The glottal explosive approach to a vowel thus implies the damming up of the air stream below the glottis before the vowel is begun. The implosive termination implies a similar damming up of the air stream immediately following the vowel. In both the approach and the termination, it is the quickness of the glottal movement plus the amount of pressure built up by the respiratory mechanism that gives the plosive quality to the sound.

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[4] Research done by R. W. West in the laboratories of the Speech Department at the University of Wisconsin.

This method of approach and termination is sometimes called the "glottal stop." It is not phonemic[5] in English and is not ordinarily represented, except in close transcription. It appears much more frequently in some languages than others, particularly in Scotch and German. In English, it is frequently substituted for other sounds, especially the plosives, in defective and dialectal speech. Thus *gentleman*, *little*, *buckle* and *button* may become [dʒɛnˀl̩mən], [lɪˀl̩], [bʌˀl̩] and [bʌˀn̩]. It is especially prevalent in cleft palate speech, since the individual is unable to create sufficient air pressure in the mouth cavity for the proper formation of the plosives and consequently substitutes a glottal plosive sound. It also occurs frequently even in cultivated speech. It may be used as a method of gaining emphasis as in the sentence, "He's *always* in trouble"—[hiz ˀɔlwɪ̣z ɪn trʌbl̩]. It is often used between two connected words when the first ends and the second begins in a vowel, especially if the two sounds are similar. Thus, in the expressions, *he even*, *who opened*, *I eyed*, we overcome a natural tendency to say [hijivn̩], [huwowpn̩d] and [ɑjɑjd] by inserting a light glottal stop, thus [hiˀivn̩], [huˀowpn̩d] and [ɑjˀɑjd]. We are not usually aware that we have used the glottal stop in such instances.

We should mention here the possibility that the strength of the explosion in the glottal explosive attack may be so greatly reduced that the acoustic effect is largely lost. This is done by making the complete closure of the vocal folds a rapid one, and perhaps by retarding at the same time the outward flow of the air stream by the action of the muscles of respiration. If, then, the vocal folds open again quickly to the point of phonation before much pressure has been built up below the glottis, the resulting sound may be very similar, acoustically, to the glottal vibratory approach. To put it more simply, a rapid glottal stop movement may sound much the same as the glottal vibratory approach. It is probable that we actually initiate many vowels in this way. This supposition is borne out by the results of playing records in reverse. Thus words beginning in vowels, for example *alm*, *apple*, *are*, may, when recorded and played in reverse, appear to end with a glottal stop. This would indicate that we do frequently, though by no means always, approach initial vowels with a light glottal stop.

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[5] Except possibly in one instance—the difference between and [m̩ːhm̩] and [ʔm̩ʔm̩].

4. Summary of the Laryngeal Modifications

Vowel sounds may be initiated in various ways by modifications of the action of the vibrator mechanism. A closure of the vocal folds while the air stream is in motion results in the glottal fricative approach. The glottal vibratory approach occurs when the folds are placed in the vibrating position before the flow of air begins. A complete closure of the vocal folds, followed by a rapid opening after air pressure has been built up beneath them, produces the glottal plosive approach. Only one of these approaches serves as a phoneme in the language, namely, [h]. Each of these approaches is paralleled by a corresponding method of terminating vowel sounds. We now turn our attention to a second general method of initiating or terminating the vowels.

Chapter 7

Inter-Vowel Glides[1]

1. Introductory Statement

One important means of beginning or ending vowels is the glide type of movement. We have already defined a glide sound as one in which the mechanism moves without interruption from the position of one sound to that of another. A vowel glide is one in which the movement is from one vowel or vowel-like position to another, accompanied by continuous voicing. For those who desire a complete terminology, we suggest the word *phone* to refer to the symbol units which are the speech sounds proper, and the word *diaphone* to indicate these glide sounds. The former means simply "a sound" and the latter "through a sound." The term *diaphoneme* would then refer to all the variants of a given glide sound in the same way that phoneme represents a phone, or sound, family.

For the present we shall discuss only those diaphones that involve only two vowel or vowel-like positions. In the succeeding pages we shall frequently describe glide sounds as beginning or ending in certain vowel positions. Such statements are always to be interpreted as meaning approximately in the positions of the given vowels. The origins and terminations of these glides vary even more than do the vowels themselves. The only essential in a vowel glide is that the articulatory mechanism move from one relatively open position to another with continuous voicing.

2. Receding and Approaching Glides

Now in every such glide movement, one of the vowel-like positions will be stressed and the other unstressed. This means that the stressed vowel will receive nearly its full vowel value, while the unstressed one will be only partially sounded. This fact is the basis for the division of all glides into two main types, receding and approaching, interpreted in relation to the stressed vowel of the pair. As type examples, we may cite [ɑw] as in *how* for the receding glides and [wɑ] as in *wah* for the approaching glides.

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[1] The reader will find it worthwhile in this connection to study Kenyon's discussion of the [w], [j] and [r] sounds. See the 6th edition of *American Pronunciation*, pp. 152–161.

Note that in [ɑw] the first sound receives the stress, and is consequently nearly as distinct and exact as if it stood alone. This, then, is the definite vowel of the pair, and the glide may be said to *recede from its position*. The second vowel, which would be [u] if the movement were completed, is unstressed. It does not receive its full value and its volume is considerably less than that for [ɑ]. Listening to the glide, it is evident that the volume *decreases* as the movement progresses. The characteristics of receding glides may be summed up as follows: (1) stress on the origin of the glide, with the result that the first vowel receives nearly its full vowel value and also marks the point of highest sonority; (2) decreasing stress as the movement proceeds, the end of the glide being the point of lowest sonority and the terminating vowel acoustically indefinite; and (3) in terms of the position of the articulatory mechanism, the origin of the glide is definite while the termination is indefinite. The movement proceeds from a definite to an indefinite position.

In the second example above, [wɑ] involves the same sounds; they are in reverse order and the stress is likewise reversed. This time it is the origin of the movement that is indefinite in position and unstressed. The end of the glide is stressed and again the [ɑ] receives its full sound value. Thus, the sonority *increases* during the progress of the glide, and the movement approaches a definite position.

This may seem complicated in the process of explanation, but it may now be stated very simply in this way: In a receding glide, the articulatory mechanism recedes from a definite vowel position to an indefinite one, with a resulting decreasing stress. In an approaching glide, the mechanism approaches a definite vowel position from an indefinite vowel position with a resulting increasing stress. Receding and approaching, then, are kinesiologic terms that indicate whether the articulatory mechanism is receding from or approaching toward the stressed vowel of the pair in a glide movement. From the standpoint of the acoustic effect, we may likewise speak of "diminuendo" glides (those in which the sonority decreases) and "crescendo" glides (those in which the sonority increases). We can also describe these glides in terms of what happens at the oral orifice through which the sound is discharged. If the size of the orifice decreases as the movement progresses, the result is a "closing" glide; if it increases, the glide is of the "opening" type. In order to avoid confusion, let us summarize these various descriptive terms using again the stock examples [wɑ] and [ɑw]:

	[wɑ]	[ɑw]
In terms of the direction of the movement in relation to the stressed vowel of the pair	approaching	receding
In terms of acoustic effect	crescendo	diminuendo
In terms of the change in size of the discharging orifice	opening	closing

The observant student will have noticed that in the example given the symbol [w] is used in both types of glides to indicate the indefinite vowel position, which is, in this instance, somewhere in the neighborhood of the vowel [u]. The position of the definite vowel is represented by its conventional symbol. The discriminating student may also have noticed that in both types of glides the indefinite [u] position was unstressed and he might infer from this a general rule that in all vowel glides involving [u], this sound will be unstressed whether it forms the origin or termination of the movement. This is an intelligent observation, and it is true with one exception which is to be noted later.[2]

The reader who has had some previous acquaintance with phonetics may also have recognized that the receding glides are the diphthongs of other writers. We have dropped this word from our terminology because its actual meaning (two sounds) is not an accurate description of what really happens, and because the term as it is generally understood includes only a small number of one type of glide sounds. It seems better to drop the word entirely than to try to place upon it a completely new interpretation. We have already suggested diaphone as a better term.

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[2] See page 125.

3. The Five Key Positions for Vowel Glides

From what we have previously said, it would appear that a glide could occur between any two vowels in the language. This is theoretically true, but practically the problem is fairly simple, because the same physiological principle that works to produce glides operates also to reduce the number of different kinds of glides. This principle may be stated briefly thus: The stressed vowel in a glide has its own well-defined articulatory position: for the unstressed or indefinite vowel the mechanism usually takes a position somewhere near the limit of movement in the direction the glide is going. (Figs. 11 and 19–24). Stated again in terms of receding and approaching glides, this means that in the receding type the mechanism will tend to *continue* the glide almost to the limit of movement in the direction in which the glide is progressing. Similarly, in the approaching type, the mechanism will tend to start the glide at the limit of movement in the direction from which it started. The reason for this is probably that, whereas any stressed vowel forms a relatively easy point at which to start or stop a glide, the unstressed position by its indefinite nature offers no stopping place and the mechanism tends to keep on going as far as it can in the direction of the movement.

The principle involved is illustrated in Figures 26 and 27. Each figure shows the right half of the vowel diagram, which contains the vowels in the series of backward and upward tongue movements. In Figure 26 we assume that a receding glide movement starts at the definite [ɑ] position and moves in the general direction of [u]. Now this movement could end at [ɒ], [ɔ], or [o], but in the English language it usually continues to [ᴜ] or [u]. The termination is indefinite and hence is represented by [w], but the general principle holds true *that the movement will continue until it reaches the limit of movement in that direction*. The termination sounds like [ᴜ] because of the rapidly decreasing sonority toward the end of the glide, and when considered acoustically is usually thought to end at [ᴜ]. Actually, however, the *movement* probably continues all the way to the [u] position. True, by making a conscious effort, one can artificially stop the movement anywhere along its upward glide. However, in the development of a language, it is not the movements that we can make with a conscious effort, but *those that can most easily be made automatically*, that prevail. This glide might just as easily start at [ɒ], or [ɔ], or [o], as well as [ɑ]. In fact, [ow] glides are very common. But no matter which sound serves as the point of origin, the movement will end near the [u] position.

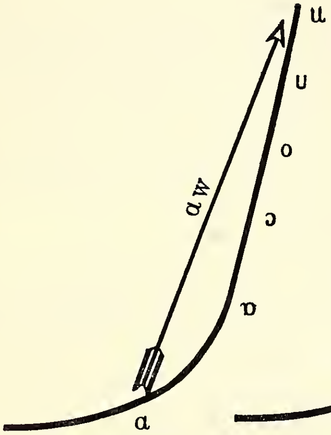

FIGURE 26.—Receding glides.

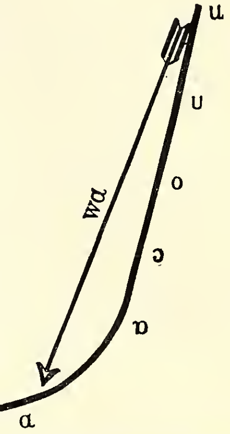

FIGURE 27.—Approaching glides.

In Figure 27, an approaching glide is represented with the movement in the opposite direction; [ɑ] is the definite point of termination—definite because stressed. Now this glide could begin at [o], or [ɔ] and proceed to [ɑ] but such combinations occur very rarely in the language, if at all. If there is to be a glide movement approaching [ɑ] from the direction of the high back vowels, the origin of that movement will almost certainly be approximately the position for [u]. Needless to say, this approaching glide, having started at [u], can have as its stressed termination any of the following: [ʊ], [o], [ɔ], [ɒ], or [ɑ].

We have previously pointed out that four of the key vowel positions represent the extremes of movement in the corresponding series of movements of the articulatory mechanism: [u], representing the extreme point in the upward and backward series of movements, [i] representing the extreme point in the upward and forward series of movements. [ɝ] representing the highest central vowel, and [ʟ] representing a high central vowel laterally emitted. (See Figs. 19, 20, 21, and 23.) A fifth important position in the production of glide sounds is the general schwa vowel area (Fig. 17). *Every vowel glide will tend to have either its origin or its termination in one of these five positions.* The other vowel in the glide, with certain restrictions to be mentioned later, may be any vowel in the language. We can make one further general statement. *One of these five key positions* [i, u, ɝ, ʟ, or ə], *regardless of the direction of the movement, will always be the unstressed vowel in a glide.*

Figure 28 illustrates schematically these five key positions and indicates the various glides that can be formed with a single given vowel, [ɑ] in this case, all of them actually present in the language. The reader can make similar diagrams showing the glides between the five key positions and other English vowels.

When a continuant sound is produced through any of the vowel positions represented in Figure 28, a conventional vowel results. For such a vowel, the mechanism must be held approximately stable in

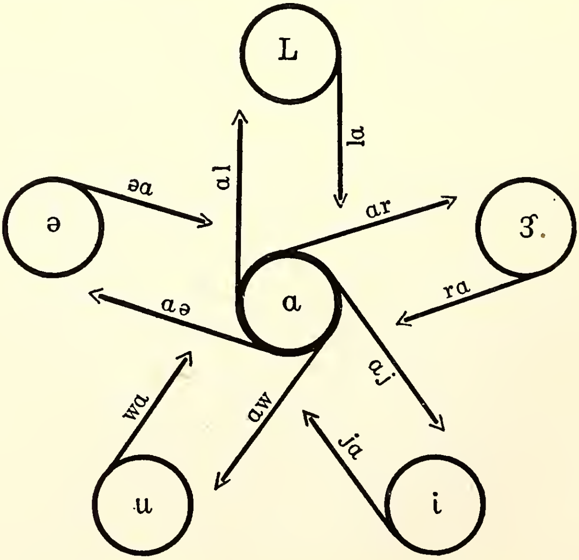

FIGURE 28.—Glides to and from the key vowels and [ɑ].

one position for at least a brief period of time. In a glide, however, the mechanism is never at rest. It is in movement from the beginning of the sound to the end.

With this statement of general principles, we may now proceed to a discussion of the receding and approaching glides centering around each of these five key positions.

4. [w] GLIDES[3] AS IN WET [wɛt] AND HOW [hɑw]

(1). *Approaching* [w] *Glides as in We* [wi], *Wet* [wɛt], *Woo* [wu], etc. This glide results when the articulatory mechanism moves from a vowel position that is approximately that of [u] to some other vowel. This is the [w] that is usually described in textbooks of phonetics. It is often considered as voiced continuant. From our point of view, there is no such thing as a [w] sound; what we ordinarily call [w] always occurs as part of a vowel glide. If there is any question as to the true glide nature of the movement that produces the [w] the student should try the simple expedient of producing it as a continuant. Take the word *waft* [wɑft], for example, and fix the articulatory mechanism in the position from which the [w] starts. If a continuant is then produced, the result will not be what we ordinarily call the [w] sound, but rather a continuant vowel that will be very close to [u]. The acoustic effect of [w] is given only when the mechanism begins moving toward the position of the following vowel. The glide nature of [w] is further indicated by the fact that if [wɑ] be recorded on a phonograph record and then reproduced with the record running backward, the result will be [ɑw], or sometimes [hɑw]. Similarly if [ɑw] be recorded and the record played backward, the result will be heard as [wɑ]. This seems to indicate that we are dealing here simply with a movement from one point to another. If the movement goes in one direction, it produces one acoustic effect; reversed, it gives another. Yet we have been accustomed to think of a separate [w] sound as existing in [wɑ], but of [ɑw] as being a diphthong made by combining [ɑ] and [u].

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[3] A number of writers in phonetics have recognized that [w], [j] and [r] in initial positions are essentially glides and not continuants. Dr. Kenyon, in his *American Pronunciation* (6th Ed., pp. 152–161) describes [w], [h̆w], [j] and [ṛ] as glide sounds. In Ward's *Phonetics of English*, page 123, [w] and [j] are classified as "semi-vowels or vowel glides." Fletcher, *Speech and Hearing*, page 8, makes this statement concerning [w] and [j]: "If the mouth is placed in the position to say *u* [u] and then suddenly changed so as to form any other vowel in the diagram, the result obtained is signified in writing by placing *w* before the vowel. In a similar way, we obtain the effect designated by *y* [j] if the position of the vowel suddenly changes from *e* [i] to any other vowel." (The brackets were inserted by the writers.) In Vietor's *Elements of Phonetics* as translated by Walter Ripman, we find these statements: On page 70 in speaking of [j] the writer says, "In English, the voiced sound is produced with so little narrowing that, as a rule, the brushing of air is hardly perceptible; and it is essentially gliding, not held." Concerning *w*, we find this statement on page 83, "Both these sounds [w] and [ʍ] are essentially gliding, not held." Other writers could be quoted, but the above are sufficient to indicate that the present writers are not alone in considering these sounds as glides.

We wish to stress again the fact that the position from which these approaching [w] glides start need not be exactly the position of the vowel [u] when produced alone. There are glide families (diaphonemes) just as there are phonemes. The most variable part of a glide is the unstressed position. The two fundamental factors in the production of [u] are likewise present in the approaching [w] glide. These two factors are the high back tongue position and the protruded, rounded lip position. When an approaching [w] glide is produced, the tongue moves from its high back position to that of the following vowel at the same time that the lips make a similar movement. There are thus two opening orifices, one formed by the lips and the other by the back of the tongue and the posterior hard palate and velum. It is interesting to note in passing that the acoustic effect of [w] is still retained when the tongue movement is eliminated. The tongue can be held flat in the mouth with a tongue depressor or pencil and a very clear [w] effect produced by a simple opening of the bilabial orifice. It is difficult to hold the lips fixed while the tongue alone moves from its position for [u] to that for some other vowel; but so far as this can be done, the results seem to indicate that the tongue movement alone is not enough to produce the effect of [w]. We are then led to the conclusion that in an approaching [w] glide the one essential factor is the opening of the bilabial orifice. The opening of the back tongue orifice is usually simultaneous with the opening of the lips, simply because the lip and tongue positions are closely associated in the production of [u]. The size of the initial bilabial orifice will be determined somewhat by the following vowel. In the word *woo* [wu], for example, in order to give the effect of [w], the movement must start from the lip position of a very close [u],[4] while in glides such as [wo], [wɔ], and [wɑ], the initial lip orifice is often larger.

It should be noted also that a movement from the position of any of the high back vowels to that of some other vowel tends to give somewhat the effect of [w]. Thus the combinations [ʊ-a], [o-ɛ], [o-i], and [ɔ-e] all sound somewhat like [w], if pronounced rapidly with the stress on the last vowel. A [w] occurs because the essential lip opening movement is present in each case. We have mentioned previously that glides like these do not stay long in the language. They soon become definite [w] glides.

There is then a fundamental difference between these glide sounds, of which [w] is a typical example, and all other sounds. A vowel, such as [u], is a continuant. It is the perceptual result of the voiced air stream exiting through a certain relatively fixed position. The essential factor is the *position* of the articulatory mechanism. [w], on the other hand, is the perceptual result of a *movement* occurring in a certain *temporal* relationship, both factors being essential. What we call a [w] is not perceived unless there is a movement involving an opening bilabial orifice occurring within certain time limits. If the movement is too slow the [w] disappears. Other glide sounds involve the same principles.

With this understanding of the nature of [w], we can predict that it will occur frequently as a transitional sound resulting accidentally from the linking of two juxtaposed vowels where the movement from one to the other is of the [w] type. Note such words as *February, going, duel, Noel, eventual, pool, school.*

(2). [ħw] *as in What* [ħwɒt] *and Twice* [t^{h}wɑjs]. Those phoneticians who consider [w] as a voiced continuant also describe [ħw] as a distinct sound, sometimes symbolized by [ʍ] and sometimes by [ƕ]. It is conventionally described as a voiceless *w*. The writers feel that the sound is more accurately described as an *h* approach to a [w] glide. This means that the vocal folds, instead of being closed to phonation at the instant the glide begins, do not close until it is partially underway, thus giving a glottal fricative approach. This is illustrated by the words *who* [hu] and *what* [ħwɒt].[5] In the first, the *h* approach takes place while the articulatory mechanism is held fixed in the [u] position; in the second, it occurs while the mechanism is in movement from the [u] position to that of [ɑ]. The first is a glottal fricative approach to a continuant vowel; the second, a glottal fricative approach to an inter-vowel glide. The fundamental principle is exactly the same in both instances.

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[4] The I.P.A. has a special symbol, [ɥ], for a very close *w*. The symbol is an upside down *h*. A key word sometimes given for this sound is the French *lui*.

We should point out also that in the *h* approach to a [w] glide the vocal folds may close to phonation at any point in the movement. Consequently the unvoiced portion of the glide may vary. The vocal folds may take hold almost at the beginning of the movement, in which case there will be very little of the *h* approach. Again, they may not close to phonation until the mechanism has almost left the [u] position with the result that the [w] will seem mostly unvoiced.

When an approaching [w] glide is preceded by an aspirated voiceless plosive consonant, as *twice* [tʰwɑjs] and *quick* [kʰwɪk], the first part of the glide is unvoiced because of the puff of air that follows these plosives in English.[6] In terms of movement, the articulatory mechanism gets started in the [w] glide before the vocal folds have closed to phonation following the production of the voiceless plosive. Such examples are to be considered as another variation of the glottal fricative approach to an inter-vowel glide.

The appearance or non-appearance of the [ħ] in a [w] glide is then dependent upon the factor of timing in the action of the vocal folds. If the vocal folds close to phonation before, or at the very instant of, the beginning of the glide movement, a [w] glide results. If the closing of the vocal folds is delayed momentarily until the glide is underway, the result is an *h* approach to a [w] glide. Note such pairs of words as *watt what, witch which, wen when, wear where,* etc.

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[5] We have mentioned that there is a basic difference between an *h* approach to a [w] glide and an *h* approach to a vowel. The difference lies in the action of the articutory mechanism. In the former, the articulatory mechanism is in movement; in the latter it is relatively stationary. In broad transcription the one symbol [h] can be used to represent both types. In close transcription the writers suggest that the symbol [h] should be used to indicate a glottal fricative approach to a continuant, as in *house* [hɑws]; and [ħ] to represent a glottal fricative approach when the articulatory mechanism is in movement, as in *what* [ħwɒt].

[6] See also, page 147.

(3). *Receding* [w] *Glides as in Cow* [kɑw] *Bow* [bow] *and Boat* [bowt]. Receding [w] glides are usually called diphthongs. The movement begins at some stressed vowel position and proceeds toward an unstressed, indefinite [u] position. [aw], [ɑw] and [ow] are the most common glides of this type. Theoretically, such a glide could begin at any vowel in the language, but actually this is not the case. The reason for this is discussed later in this section.

The vowel [o] almost never occurs in English as a pure continuant. It is a receding [w] glide [ow],[7] especially in stressed syllables. In unstressed syllables, the glide nature of [o] is less apparent, but it is probably never a pure vowel.

5. [j] GLIDES AS IN YES [jɛs] AND SAY [sej]

(1). *Approaching and Receding* [j] *Glides.* There are approaching and receding [j] glides that are similar in nature to the [w] glides. The position here involved is that of the high front vowel [i]. This position is always unstressed and indefinite. When the movement begins at or near the position for [i] and proceeds with increasing stress to that of some other vowel, we have an approaching [j] glide as in *yes* [jɛs], *ye* [ji], *onion* [ʌnjən], *yam* [jæm], *yard* [jɑrd], etc. When the movement begins at the position of some other vowel and proceeds with decreasing stress to a termination at or near the [i] position, we have a receding [j] glide as in *way* [wej], *name* [nejm], *high* [hɑj], *boy* [bɔj], etc.

Like [w], [j] has been considered as a separate sound when it formed the origin of a glide, but as a part of a diphthong ending in [ɪ] when it was the termination. We have here followed our general principle of using the same symbol, [j], to represent the indefinite position in both approaching and receding [j] glides. The essential nature of both the [w] and the [j] sounds may be illustrated by pronouncing rapidly, with continuous voicing, [iuiuiuiu]. The opening of the lingua-palatal orifice in going from [i] to [u] results automatically in the [j] sound, while the enlargement of the bilabial orifice in going from [u] to [i] produces [w]. The result is [ijuwijuwijuwiju].

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[7] This glide is also heard as [ɛw], [ʌw] and [æw], particularly in southern Ohio and West Virginia.

The size of the lingua-palatal orifice at the beginning of the glide may vary. The articulatory position will be essentially that of [i]. It may be very lax and open when the glide is from [i] to some open vowel like [ɑ], or it may be close as in *ye* [ji]. In the latter case, the initial position will be more like that of cardinal [i], or it may even start from the position of the voiced lingua-palatal fricative [ᴊ].[8] The terminating position may vary in a similar fashion but the principles underlying the various [j] glides remain the same.

(2). *The h Approach as in Huge* [ħjudʒ], *Human* [ħjumṇ], *Cute* [kʰjut], etc. The principles here are the same as those applying to the *h* approach to the [w] glides. The closure of the vocal folds is delayed for a fraction of a second after the articulatory mechanism has begun its glide movement with the result that the first part of the glide is unvoiced. This glottal fricative approach to a [j] glide is to be distinguished from the voiceless lingua-palatal fricative [ç][9] which is made through approximately the same position. In the former, the articulatory mechanism is in movement while the vocal folds are closing; in the latter, it is held fixed with the vocal folds open.

6. [r] GLIDES AS IN RAH [rɑ] AND ARE [ɑr][10]

Since these glides are exactly similar in nature to the [w] and [j] glides, we can omit all discussion of the general principles involved. The key position is that of the [ɝ], the high central vowel. If a continuant is made through this position, the result is the conventional vowel previously described. In approaching [r] glides the movement is from the [ɝ] position to that of some other vowel. Examples: *rot* [rɒt], *rote* [rowt], *root* [rut], *rut* [rʌt], *red* [rɛd], etc. If the movement is from some other vowel to [ɝ], the glide is of the receding type, as in *bear* [bɛr], *war* [wɔr], *far* [fɑr], *fear* [fɪr],[11] etc. In words like *merry* [mɛrɪ̣], and *Erie* [ɪrɪ̣], both types are present.

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[8] See page 136.

[9] See page 138.

[10] For a complete discussion of the *r* phoneme, see page 152. See page 80 for the discussion of [ɝ].

[11] In Southern and Eastern speech, words of this type are usually pronounced with lengthened vowels or schwa glides thus: [bɛə], [wɔː], [fɑː] and [fɪə].

The [r] sound is seldom considered as a glide. Yet it seems evident that the *r* that occurs before and after vowels is definitely a glide sound. In the word *red*, for example, if the articulatory mechanism is set in position for the beginning of this word and held there while a continuant is produced, the result is a vowel-like sound that is either [ɝ] or something close to it. This sound can be continued indefinitely, but the [r] as we hear it in *red* does not occur until the mechanism begins to move toward the [ɛ] position. This procedure would produce something like [ɝ . . . rɛd]. This [r], then, is the acoustic effect of moving away from the [ɝ] position. In the word *are* [ɑr], on the other hand, the [r] is the acoustic effect of moving to the [ɝ] position. The movement begins at [ɑ], continues up to [ɝ], and then stops simultaneously with the cessation of sound. If, at the end of the movement, the mechanism is held fixed in the [ɝ] position and the voicing continued, the result is not [ɑr] but [ɑrɝ . . .]. In a word like *furry* [fɝrɪ̣], the mechanism is held in the [ɝ] position long enough to give the effect of a continuant vowel and then moves to the [ɪ] position, thus producing a glide [*r*].

There is no reason why there could not be an *h* approach to approaching [r] glides just as there is in the case of [w] and [j]. However, such an approach is not used in modern English. We could, for instance, have correlative words like *rot* [rɒt] and *rhot* [hrɒt] just as we have *watt* [wɒt] and *what* [hwɒt], and *you* [ju] and *hue* [hju]. There are plenty of *rh* spellings in the language, but in no case is the *h* attack used in pronunciation, as it often is in the *wh* words. Note the words: *rhapsody*, *rheumatism*, *rhinoceros*, *rhythm*, etc. The nearest approach to the [hr] sound comes in words like *try* [tʰrɑj] and *cry* [kʰrɑj] in which the first part of the [r] glide is unvoiced because of the influence of the preceding voiceless plosive.

7. [l] Glides, as in All [ɔl] and Law [lɔ]

These are glides to and from the position of the vowel [ʟ]. There may be a receding glide from any vowel in the language to the [ʟ] position, or an approaching glide from the [ʟ] position to any vowel in the language. They are produced in accordance with the same principles as the other glides that we have discussed. As in the case of [r], the glide nature of the [l] can be seen by a comparison of the receding and approaching glides in such words as *all*, *law*, *ill*, *will*, *ail*, *lay*, etc. Then note the same sound when it is produced as a continuant vowel in *bottle* and *buckle*. The [ʟ] position which serves as the point of origin or termination for these [l] glides may vary, just as does the vowel, from [ʟ] to [ᴌ]. [l] glides may be, but usually are not, accompanied by perceptible friction noises.

The tongue position for the *l*, as either a vowel or a glide, is influenced, among all speakers, by the associated vowels or consonants. Thus, the *l* in *buckle* [bʌkᴌ̩] is made with the point of elevation of the tongue farther back than is the case in *battle* [bætʟ̩][12] because of the influence of positions for the preceding plosives. Similarly, the *l*'s in *mill* and *leap* are produced farther forward than those in *lull*. We should point out here that the so-called "lightness" or "clearness" of an *l* is not entirely dependent upon the position of the forepart of the tongue. In other words, the terms "front *l*" and "light *l*" are not exactly synonymous. A little experimentation will demonstrate that it is possible to keep the tip of the tongue on the upper teeth and produce *l*'s of varying degrees of lightness and darkness.[13] Some of these variations in position are shown in Figures 29–36.

Two factors other than the point of highest elevation of the tongue play a part in determining the degree of lightness or darkness of an *l*. One of these is the amount of lip spreading. An increase in lip spreading appears to produce a lighter variety of *l*. The other, and most important, factor is the position of the remainder of the tongue. The back of the tongue needs to be flattened and lowered for a very clear *l*, whereas darker varieties are produced with the back of the tongue raised, even when the tip is elevated to the upper teeth or rugal ridge.

Such factors as these probably account for the dialectal differences in the *l* sound that exist in addition to the variations produced by the influence of adjacent sounds. Southern speech frequently employs a

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[12] The words can also be pronounced as [bʌkəɫ] and [bætəl], in which case the *l*'s will still be influenced by the positions for [k] and [t], although to a lesser extent

[13] The Dialect Atlas Survey uses a series of modifying sings to indicate various degrees of lightness and darkness in an *l*. We need note here only one of these, the symbol, [l̹], for a very light *l*. Attention should also be called to the I.P.A. symbol [ʎ], (an inverted *y*) as in the Spanish *Villa* [biʎɐ]. It occurs also in Italian. The sound is apparently a light *l* made with the tongue tip behind the lower teeth and followed closely by a [j] glide.

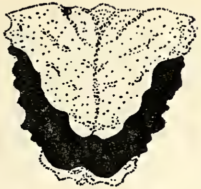

FIGURE 29.—Palatogram of [ᴌ] or [ł]—bilateral release.

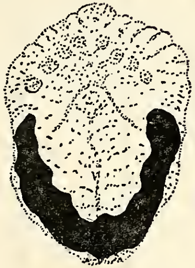

FIGURE 30.—Linguagram of [ᴌ] or [ł]—bilateral release.

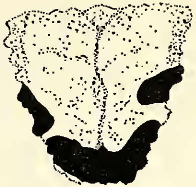

FIGURE 31.—Palatogram of [ʟ] or [l]—bilateral release. This shows an unusual type of bilateral orifice.

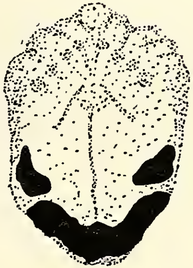

FIGURE 32.—Linguagram of [ʟ] or [l]—bilateral release.

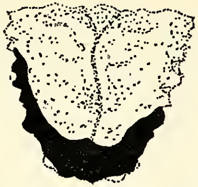

FIGURE 33.—Palatogram of [ʟ] or [l]—unilateral release.

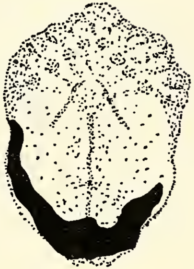

FIGURE 34.—Linguagram of [ʟ] or [l]—unilateral release.

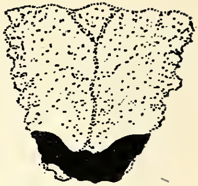

FIGURE 35.—Palatogram showing the starting position for the glide [læ].

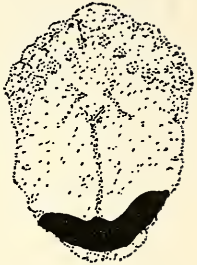

FIGURE 36.—Linguagram of the starting position for the glide [læ].

lighter *l* than is typical in such words as *Alice, lily,* and *till,* whereas Mid-Western speech is often characterized by an over-dark *l* in words like *pool, school* and *mule.*

8. Schwa Glides

(1). *Receding Schwa Glides as in Noah* [noʷə], *Boa* [boʷə], *and in Eastern and Southern speech, Ear* [ɪə], *Wear* [wɛə], *Oar* [oʷə], *Poor* [puə], *etc.* These glides, which have often been called "off-glides," are here called schwa glides signifying that there is a glide from the position of some accented vowel into the schwa area although it need not necessarily reach the actual neutral position. The [ə] is always unstressed and indefinite in position. Any final vowel may end with a schwa glide. Such glides occur most frequently, however, in the East and South where a receding schwa glide is used instead of the receding *r* glide so common in the Middle West in words such as *oar, ear, are,* etc. A partial schwa glide is also often present in the Eastern and Southern pronunciation of those words in which the *r* is preceded by a vowel and followed by a consonant. Thus *hard, form,* and *horde* may be either [hɑːd], [fɔːm] and [hoʷːd] or [hɑᵊd], [fɔᵊm] and [hoʷd]. These receding schwa glides occur because of the tendency of the articulatory mechanism to return to the neutral position.

(2). *Approaching Schwa Glides.* Approaching schwa glides are much less common than receding. An incipient schwa glide occurs following consonants made with the tongue in the neutral position—[p], [b], [f], [v], [m], etc. Because the tongue is in the neutral position in making these consonants, it goes through that position on its way to the following vowel. Thus in the words *by, pie, my, vie, fie,* etc., there is usually a slight [ə] glide between the initial consonant and the vowel so that these words would be written phonetically in close transcription as [bᵊɑj], [pᵊɑj],[14] [mᵊɑj], [vᵊɑj], [fᵊɑj], etc.

The prominence of the approaching [ə] glide is determined by three factors: the degree of voicing present in the initial consonant, the speed of the transition between the initial consonant and the following vowel, and the timing of the tongue movements. The glide is thus more prominent following a voiced than an unvoiced sound. Again, the earlier the voicing begins after an initial unvoiced consonant, the more prominent the glide. If the transition movement is slow the [ə] glide becomes more noticeable. If the tongue remains in the neutral position until after the formation of the initial consonant and then moves to the position of the following vowel, an [ə] glide will be definitely present. However, if the tongue is pre-set in the position of the vowel before or during the production of the initial consonant, there will be no [ə] glide.

9. MULTIPLE-VOWEL GLIDES

Up to this point we have confined our discussion, if not our illustrations, to glides that involve only two vowel positions. It must be obvious by this time that many glide movements go through more than two vowel positions. Three-vowel glides occur in such words as *rice* [rɑjs], *pail* [pejl], *goal* [gowl], etc. Such examples could be multiplied indefinitely. Some words are produced by a continuous glide movement from the beginning to the end. Note for example *railway* [rejlwej], *laurel* [lɔrʟ̣], *early* [ɝlɪ̣], *hourly* [ɑwrlɪ̣], and *orally* [owrəlɪ̣]. Such words involve no new principles beyond those already mentioned in connection with the two-vowel glides.

10. SUMMARY OF GLIDE SOUNDS

We are now in a position to summarize this discussion of glides as a method of connecting vowel sounds, in the following series of statements:

(1). In every glide between two vowel or vowel-like positions, one is stressed and the other unstressed; one is definite in position and the other indefinite.

(2). Glides are designated as receding if the movement is away from the stressed vowel, and as approaching if the movement is toward the stressed vowel. The former is characterized by decreasing, and the latter by increasing, stress.

(3). The definite vowel position may be any vowel in the language. In actual practice there are certain limitations to this general statement.

(4). The position for the indefinite vowel will always be in, or near to, one of the five key vowel positions: [u], [i], [ɝ], [ʟ] or [ʌ].

(5). Glides to or from the [u] position are represented by [w], to or from the [i] position by [j], to or from the [ɝ] position by [r], to or from the [ʟ] position by [l], and to or from the [ʌ] (neutral position) by [ə].

(6). Approaching [w], [j], [r] and [l] glides occur commonly with every vowel in the language. Receding [r] and [l] glides occur frequently with every vowel.

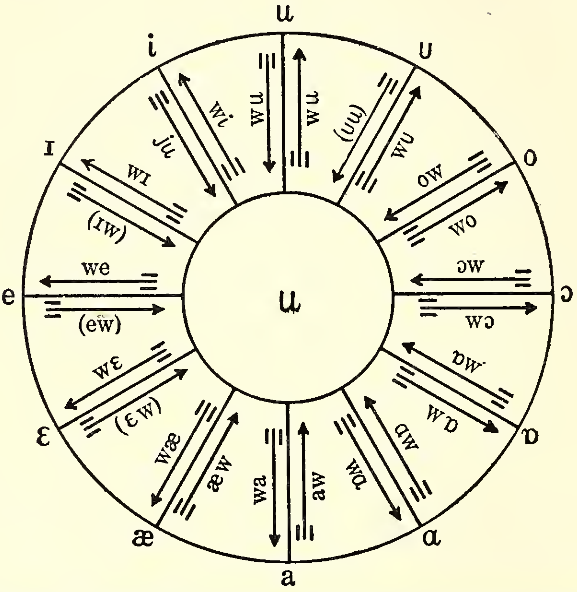

FIGURE 37.—Glides to and from the front and back vowels and [u].

(7). Receding [w] and [j] glides tend to occur only in certain accepted combinations. This statement is illustrated in Figure 37 and explained in the accompanying discussion.

Figure 37 shows all of the glides formed between [u] and the front and back vowels. The shape of the diagram is purely a matter of convenience in representation, and has no significance. The approaching glides are indicated by the arrowheads pointing toward the periphery. It can be seen at a glance that all of the glides of this type are common in the language. Receding glides are indicated by the arrowheads pointing toward the center of the circle. Four of the glides formed by movements in this direction are enclosed in parentheses. They are [ʊu], [ɛu], [eu] and [ɪu]. [ʊu] does not form a good glide because the sounds are too close together. Varieties of [ɛu] and [eu] glides do sometimes occur in American speech, but they are relatively rare and are usually considered unpleasant and dialectal. A glide from [ɪ] to [u] will probably become [ju]. The student can make a similar chart for [j] glides. Approximately the same conditions will be found to be present.

There still remains to be discussed, the results of glides between any two of the five key vowel positions. These are illustrated by words like *we* [wi], *you* [ju], *eel* [il], *lea* [li], *were* [wɝ], *rue* [ru], etc. This is the exception to the statement that these vowel positions will always be unstressed when they occur in a glide sound. We should also mention here the glides represented by such words as *woo* [wu], *ye* [ji] and *stirrer* [stɝrɝ̣], in which both the origin and termination are centered around the same key vowel. In all these instances, the articulatory mechanism in the approaching glide starts from a position that is closer than customary for the vowel concerned, and the glide effect is obtained by the same type of movement present in other glide sounds.

11. TRANSITION

Following our description of the sixteen vowel phonemes, we began our consideration of the remaining speech sounds as methods of initiating, connecting, and terminating these vowels. We have thus far discussed two general methods: first, the various methods of initiating and terminating vowels that result from the action of the laryngeal valve, and second, the inter-vowel glide as a method of connecting vowels. We are now ready to consider a third important method of modifying vowels. These vowel sounds may be initiated, connected, or terminated by sounds, other than the vowels themselves, set up in the oral cavity as a result of further modifications of the outflowing air stream by the articulatory mechanism. These are essentially the consonants. In our discussion we have grouped these sounds under the general heading "Oral Modifications."

Chapter 8

Oral Modifications of the Vowels: The Consonants

1. Introductory Statement

We have already defined vowels as speech sounds in which the voiced air stream is emitted through a relatively large opening in the oral cavity. In such vowel sounds, friction noises are absent or of negligible importance. We come now to a consideration of a second group of speech sounds formed by further modifications of the oral cavity—the consonants. They provide the most frequently used method of beginning, connecting, and ending vowels. The sounds to be discussed under this heading are all symbol units.

The word *consonant* is an acoustic term indicating that these sounds are accompanied by certain friction noises. In terms of movement, consonants are either continuants or stops. A continuant consonant is a speech sound produced by forcing the air stream through an opening in the oral cavity small enough to produce friction noises. For all practical purposes, the articulatory mechanism is held fixed during the production of the sound. These consonants may be voiced, that is, made with the vocal folds closed to the point of vibration; or voiceless, that is, made with the vocal folds open. *Vibrated* and *sonant* are synonyms for *voiced*. *Surd*, *breathed*, and *whispered* are sometimes used to mean *unvoiced*. With any given position of the articulatory mechanism, it is thus possible to produce two sounds that will be analogues of each other—one voiced and the other voiceless. The voiced, continuant consonants in English are [v], [ð], [z], and [ʒ]. Their voiceless analogues in the same order are [f], [θ], [s], and [ʃ]. Some phoneticians also list [w], [j], [l] and [r] as continuant consonants. These sounds have been classified as vowel glides in this discussion.

The stop sounds are produced by stopping the air stream at some point in the oral cavity, thus building up a slight pressure and then releasing it suddenly. Acoustically, these sounds are plosives. They have two phases. The first is an implosive phase during which the articulatory mechanism is moving to the closed position and pressure is being built up within the oral cavity. Typically, the mechanism is held in this position for a very brief period with a resulting further increase in pressure. In the second, or explosive, phase, the mechanism moves rapidly from the closed position, and the imprisoned air is emitted explosively. The voiced stop sounds in English are [b], [d] and [g]. Their voiceless analogues are [p], [t] and [k].

With this introduction, we are ready to discuss each consonant in some detail.

2. Continuant Consonants

(1). [v] *as in Vat* [væt] (*Voiced Labio-dental Continuant*).[1] This sound is the result of the passage of the outflowing air stream through the articulatory mechanism after it has assumed the position characteristic of the sound. This position is brought about by four modifications of the neutral position: (1) Approximation of the vocal folds; (2) closure of the port into the nasopharynx; (3) depression of the mandible to the position for the neutral vowel [ʌ]; and (4) a loose contact between the lower lip and the upper incisors (Fig. 38).

Ordinarily these movements occur practically simultaneously. The exact time order is not important so long as the articulatory mechanism is placed in position before, and held there relatively fixed during, the emission of the voiced air stream.

No movement of the tongue from the neutral position is required. It may lie in the neutral position or it may assume any position not actually blocking the flow of air through the oral cavity.

The amount of depression of the mandible is variable, but some downward movement is required in order to make room for the action of the lower lip. There may conceivably be some retraction of the mandible, but this movement is not essential and probably seldom occurs.

With the mandible depressed, the partial labio-dental closure of the oral orifice is effected by an elevation and drawing inward of the lower lip, so that it touches lightly the upper incisors. At the same time, the angles of the mouth are drawn slightly laterally. While this loose contact between the lower lip and the upper incisors is essential, the exact point of contact on the red-lip margin is not important. Ordinarily, there is only a relatively slight inward movement of the lower lip so that the contact is made on its inner border. The upper lip may move passively but its own fibers are not in contraction.

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[1] Although the descriptive names of the various consonants have been drawn largely from Kenyon's *American Pronunciation*, the writers have introduced a number of modifications in his terminology.

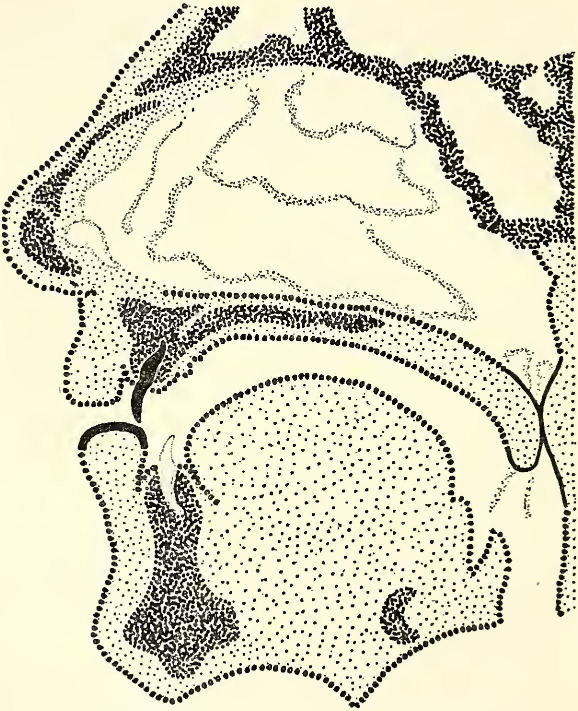

FIGURE 38.—The position for [v] and [f].

Thus this sound involves essentially the deflection of a voiced column of air into the oral cavity, the external orifice of which has been previously fixed so that the air stream can escape only through a narrow opening between the lower lip and upper teeth. As a result of the narrowness of this opening there is some increase in the air pressure within the mouth cavity. Acoustically, this sound is the result of low frequency laryngeal vibrations plus high frequency friction noises produced by the passage of air through the narrow labio-dental orifice. The sound is a continuant: that is, it can be produced without change of position as long as there is an outflowing column of air.

(2). [f] *as in Fat* [fæt] (*Voiceless Labio-dental Continuant*). This sound may be described as identical with [v] except that the vocal folds are not approximated. Thus, the only acoustic elements present in this sound are the high frequency vibrations resulting from the passage of the air stream through the narrow labio-dental orifice.[2]

(3). [ð] *as in Then* [ðɛn] (*Voiced Lingua-dental Continuant*). The position of the articulatory mechanism for [ð] may be described as fol-

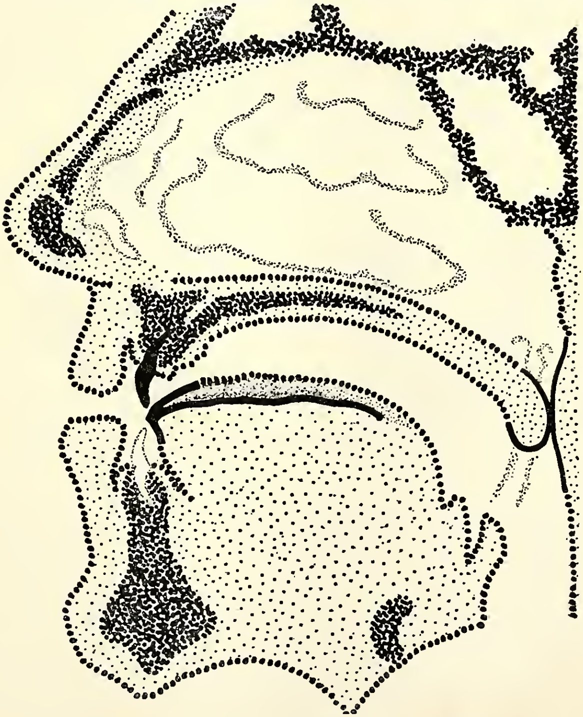

FIGURE 39.—A typical position for [ð] and [θ]. See also Figures 40–43.

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[2] The I.P.A. uses the symbols [F] and ʋ], representing a lax [f] and a lax [v]. [F] and [ʋ] are made with a labio-dental contact so lax that the friction noises are greatly reduced, if not absent. The sounds are used in German.

lows: (1) The vocal folds are approximated; (2) the port into the nasopharynx is closed; (3) the mandible is depressed about halfway to the position of the neutral vowel [ʌ]; (4) the lips are everted so as to form an orifice similar to that for [z] but slightly larger; and (5) the sides of the tongue are elevated so that they lie in contact with the inner borders of the upper teeth and with the alveolar ridges, leaving a wide central cavity for the passage of the air stream. The tip of the tongue is flattened, elevated, and protruded so that its inferior surface rests on the lower teeth, while the tip of its dorsal surface is in light contact with the lower edges of the upper teeth (Figs. 39–41).

The sound results from the passage of the voiced air stream through a wide but extremely shallow orifice formed between the flattened tip of the tongue and the lower edges of the upper teeth. The friction noises produced at this lingua-dental orifice, plus the laryngeal tone, make up the acoustic characteristics of this sound.

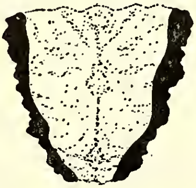

FIGURE 40.—Palatogram of a typical [ð].

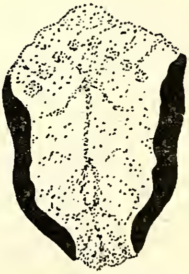

FIGURE 41.—Linguagram of a typical [ð].

Variations arise in the movements of the lip, jaw and tongue. The lips must be open, but the size and shape of the opening may vary within rather wide limits. The mandible must be depressed far enough to make room for the action of the tongue described above, but the movement may go some distance beyond this point without distorting the sound. The tongue may be protruded between the teeth for varying distances, just so long as there is a narrow orifice between the tip of the tongue and the upper teeth. This is the so-called "interdental" *th*. In general, the movements are those described above, although the inter-dental *th* is fairly common. (See also Figs. 42 and 43.)

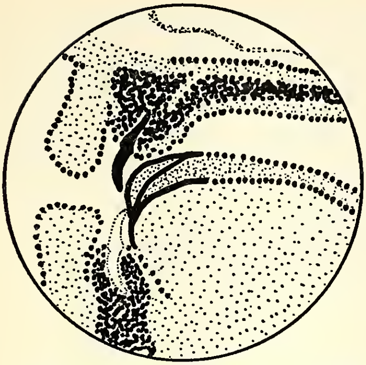

FIGURE 42.—Tongue blade [ð] or [θ]. The tip of the tongue lies behind the lower teeth.

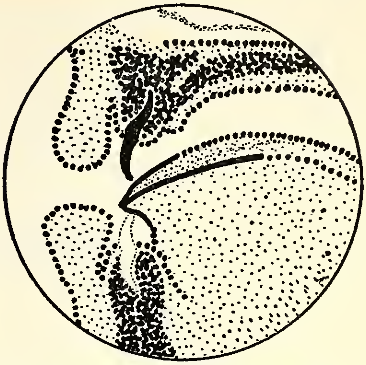

FIGURE 43.—Interdental [ð] or [θ].

(4). [θ] *as in Thin* [θɪn] (*Voiceless Lingua-dental* fric *Continuant*). This sound is the voiceless analogue of [ð]. The vocal folds are not approximated, and the friction noises are increased because of the greater volume of air passing into the oral cavity. The movements made in producing the sound are the same as those for [ð].[3]

(5). [z] *as in Zebra* [zibrə] (*Voiced Lingua-alveolar Continuant*). The [z] position is brought about by the following modifications of the neutral position: (1) The vocal folds are approximated; (2) the port into the nasopharynx is closed; (3) both lips are everted slightly so as to produce a small orifice; and (4) the entire tongue is flattened and elevated (Figs. 44–46). Its sides lie in contact with the inner borders of the upper teeth and with the alveolar ridge as far forward as the second incisors. The dorsum of the tongue makes an extensive but variable contact with the hard palate, leaving only a narrow central cavity for the passage of the air stream. The tip of the tongue is flattened, elevated, and drawn forward so that it makes a complete contact with the alveolar ridge of the maxilla immediately behind the incisor teeth, except for a small orifice formed along the median fissure of the tongue. This orifice permits the escape of a minute stream of air which is directed downward and then outward in such a manner as to pass over the cutting edge of one of the lower incisors. Usually the air stream is delivered centrally—that is, close to the midline. It is the passage of the air stream against the cutting edge of some lower tooth that produces the high frequency hissing sound that, along with the laryngeal tone, is characteristic of [z].

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[3] [θ] and [ð] do not occur in German, French, and Italian; in fact, the sounds are almost peculiar to English and are lacking in nearly all modern languages. They are a constant source of difficulty for foreigners who try to learn English. Usually dental *t* and *d* are substituted by foreigners for [θ] and [ð], respectively. Castillian Spanish has [θ], although the sound seems to have come into the language as an affectation, in imitation of a popular lisp. Castillian also has a variety of [ð] which seems to be an affricate combination [d̪ð], with the *d* lightly exploded. (The modifier [̪] indicates that the sound under consideration is made dentally.) It is sometimes represented by the special symbol [đ]. Colonial Spanish has no [θ], but has a [ð] that resembles the English sound.

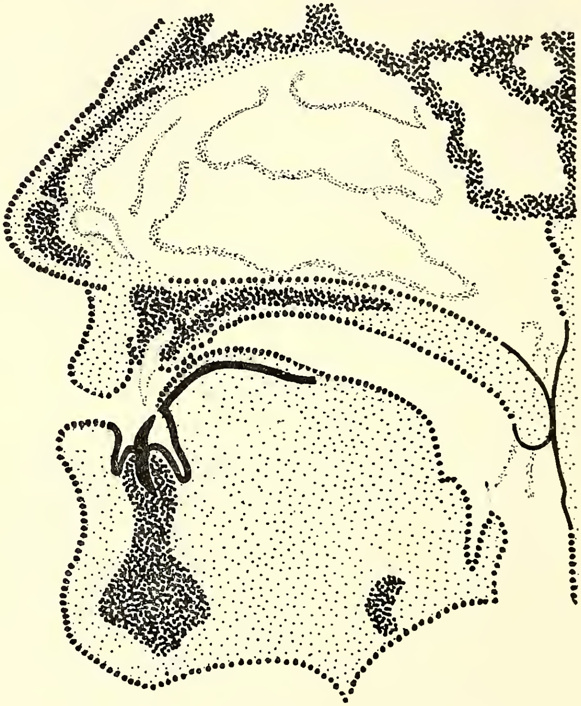

FIGURE 44.—A typical position for [z] and [s].

The movements described above are typical of the [z] sound as it is made by most individuals. The sound is, however, subject to many variations. There are but three absolute essentials: (1) the production of a laryngeal tone, (2) the deflection of the air stream into the oral cavity, and (3) the exit of this voiced air stream through a narrow orifice and against the cutting edge of some tooth.

The bilabial orifice must be open, and this opening is probably always effected by an active movement of the lips themselves. The amount and nature of the opening are variable factors. Typically, the shape of the orifice is roughly that of an elongated oval, flattened on the lower side.

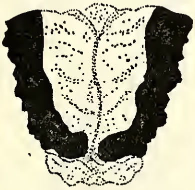

Figure 45.—Palatogram of a typical [s].

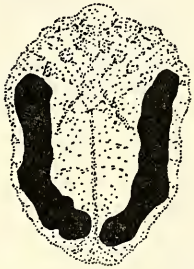

Figure 46.—Linguagram of a typical [s].

Apparently no one position of the mandible is essential to the sound. It can easily be demonstrated that the sound can be made with the mandible in various degrees of depression, but in ordinary articulation the movement is very slight and probably not essential.

The movements of the tongue are the most variable of all. For any one individual, the movements are always approximately the same, except as they vary due to the influence of neighboring sounds. There is considerable variation from one individual to another. The tongue is a very adaptable organ and adjusts itself readily within rather wide limits to conditions within the mouth cavity. In different individuals the formation of the teeth is the chief variable factor affecting the production of [z]. Since we are interested in the average or typical movements in the articulation of the sound, we shall not concern ourselves here with a description of all the possible variations. The variety of *s*'s is due to individual, rather than regional, differences.

One common variation, existing in many individuals, and apparently unrelated to any anomaly of teeth formation, might well be mentioned. These individuals place the tip of the tongue against the inner borders of the lower teeth, while the blade is rolled upward, making about the same contacts as those described above. Acoustically, the sound is identical with that produced in the so-called normal manner. Figures 47 and 48 illustrate two variations of the typical *s* position.

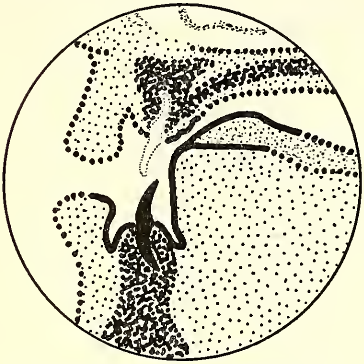

FIGURE 47.—The position for a lingua-rugal [s].

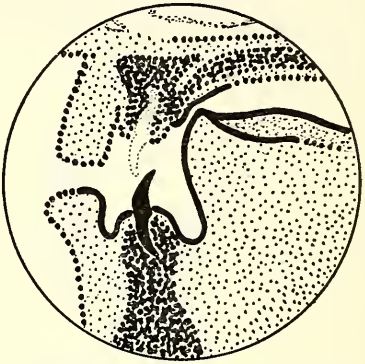

FIGURE 48.—The position for a retroflex [s].

(6). [s] *as in Sun* [sʌn] (*Voiceless Lingua-alveolar Continuant*). [s] is a voiceless sound, which means that in its production the vocal folds are not approximated. Otherwise the sound may be described as exactly similar to [z]. The discussion of the essential, as opposed to the variable, factors in the production of [z] is equally applicable to [s].

(7). [ʒ] *as in Vision* [viʒən] (*Voiced Lingua-palatal Continuant*). Starting from the neutral position, the following movements are required to bring the mechanism into the position for [ʒ]: (1) The vocal folds are approximated; (2) the port into the nasopharynx is closed; (3) the lips are open and protruded slightly so as to form a small, elongated, oval-shaped, orifice, (4) the sides of the tongue are elevated so that they come in contact with the inner borders of the upper teeth, the alveolar ridges, and a variable portion of the hard palate as far forward as the first premolar teeth, leaving a wide central passage for the passage of the air stream. The tip of the tongue is flattened, elevated, and drawn forward in the direction of the anterior hard palate just posterior to the alveolar ridge. As a result, the sides of the flattened tip are in contact with the inner borders of the teeth and the corresponding gums at approximately the point between the canine and the first premolar. The contact continues centrally on the anterior hard palate for a short distance, leaving a wide but relatively shallow orifice between the tip of the tongue and the palate. The voiced air stream passes through this orifice and out between the lips and teeth (Figs. 49–51).

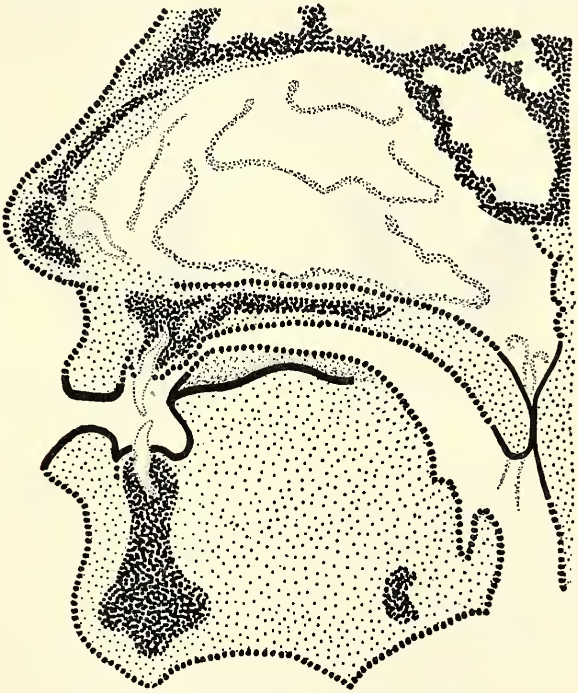

FIGURE 49.—The position for [ʒ] and [ʃ].

It will be noted that this sound is very similar to [z], except that for [ʒ] the lingua-palatal orifice is much wider and slightly farther back on the hard palate, while the bilabial orifice is more rounded and protruded.

The mandible remains in approximately the neutral position, although in some individuals it may be slightly depressed. Although the [ʒ] can be made with the lips in almost any position, a certain amount of lip rounding almost invariably accompanies its production and seems to add a characteristic resonance caused by the formation of a small cavity between the lips and the teeth. The amount of rounding and protrusion of the lips varies with different individuals. It also varies under the influence of adjacent sounds. Note the difference in lip position for the [ʒ] sounds in *beige* and *rouge*. The movements of the tongue may vary somewhat, but they remain essentially as described above.

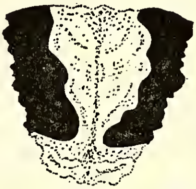

Figure 50.—Palatogram of [ʒ].

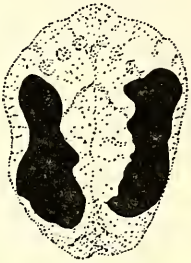

Figure 51.—Linguagram of [ʒ].

(8). [ʃ] *as in Sheep* [ʃip] (*Voiceless Lingua-palatal Continuant*). This sound is the voiceless analogue of [ʒ]. Like all the voiceless continuant fricatives, the friction noises are accentuated by the increased volume of air entering the oral cavity as a result of the fact that the vocal folds are not closed.

(9). [ʝ] *as in Fille* [fiʝ] (*French*).[4] This sound is also a voiced lingua-palatal continuant like [ʒ]. The difference is that in the case of [ʝ] the lingua-palatal orifice is formed farther posterior (Figs. 52–54). The position for [ʝ] can be located approximately by making an [i] sound so close that friction noises are set up. The same effect can be obtained by placing the articulatory mechanism in the position for the beginning of the glide [ji] and then making a continuant through this position instead of allowing the mechanism to glide on to the [i].

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[4] When a non-English key word is given, it is to be assumed that the sound does not occur regularly in English. However, it is not to be assumed that the sound is limited to the language chosen for the example.

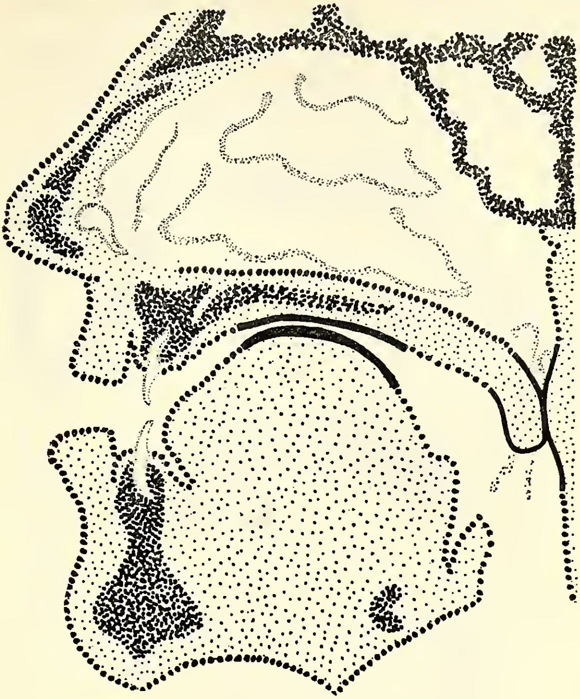

FIGURE 52.—The position for [ᴊ] and [ç]. This position can also be the starting point for [j] and [ħj] glides and the point of termination for [j] glides.

[ᴊ] is not present in English. The glide [j] is very common but the continuant [ᴊ] is not used. Some books on phonetics use the one symbol, [j], to represent both the glide and the continuant sound made around this lingua-palatal position.

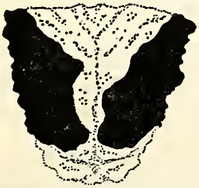

FIGURE 53.—Palatogram of [ᴊ].

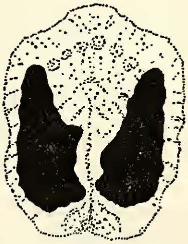

FIGURE 54.—Linguagram of [ᴊ].

(10). [ç] *as in Ich* [ɪç] (*German Ich Laut*). This sound is the voiceless analogue of [ᴊ] and is usually known as the German *ich laut*. It is produced through the same position as [ᴊ]. This sound does not occur in English, our nearest approach to it being the glottal fricative approach to a [j] glide. Thus if we take the word *huge* [hjudʒ] and prolong the first stage of the glide as a continuant, we will produce a very passable [ç].

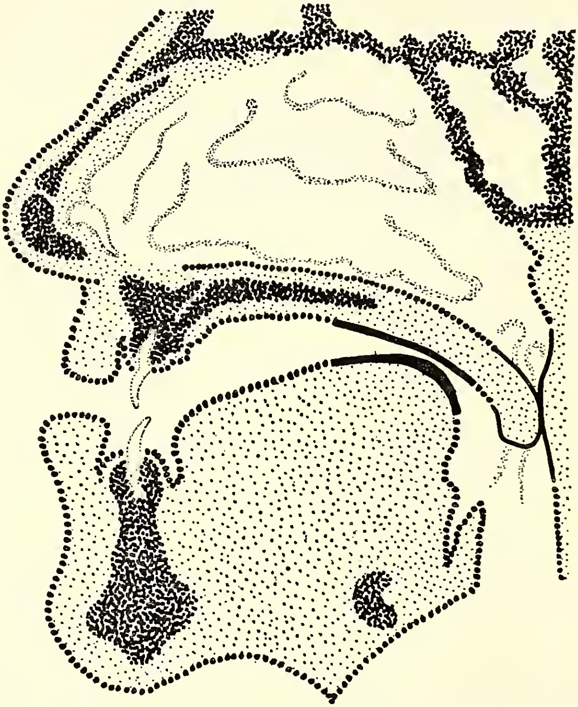

Figure 55.—The position for [γ] and [χ].

(11). [γ] *as in Rogar* [řoγɑř] (*Spanish*). (Figs. 55–57.) This sound is also a foreign sound, and can be called a voiced lingua-velar fricative. The position for it is approximately that of our English [g] as in *go* [gow], to be described a little later (Fig. 63). The distinction between the two sounds is that [g] is emitted explosively following a complete stoppage of the air stream, whereas [γ] is a fricative continuant.

(12). [x] *as in Ach* [ɑx] (*German Ach Laut*). The [x] is the voiceless analogue of [γ].[5] It is also called the German *ach laut.* It is made through the same position as [γ] but with the vocal folds open. It is thus a voiceless lingua-velar fricative. This sound differs in its production from [ç] in the same way that [γ] differs from [j]. See the table on page 152.

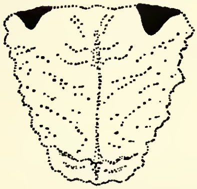

FIGURE 56.—Palatogram of [γ]. Note the small size of the contact between the dorsum of the tongue and the hard palate. The tongue may or may not come in contact with the hard palate in making this sound.

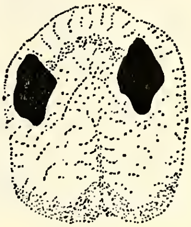

FIGURE 57.—Linguagram of [γ].

3. THE PLOSIVE CONSONANTS

(1). [b] *as in Bat* [bæt] (*Voiced Bilabial Plosive*). The production of this sound is the result of a series of movements occurring in a certain time order. Starting from the neutral position, these movements may be described as follows: The vocal folds are approximated and the port into the nasopharynx closed, these two movements occurring almost simultaneously. The voiced air stream is thus directed into the oral cavity, and, since the lips are still in the neutral position, i.e., closed, this results in a brief period of rising pressure within the mouth cavity (Fig. 58). This increase in pressure is usually resisted by a slight increase in the firmness of contact between the two lips. In lax utterance there may be no more bracing of the lips than that present in the neutral position, while in vigorous articulation, the lips are firmly approximated and the buccinator or cheek muscles may contract slightly. Both these factors serve to resist, and the latter to increase, the rising pressure.

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[5] The sound is very similar to the lingua-velar fricative *r*, [ʁ], see page 160. Confusion is avoided in Spanish, since this language has only front tongue *r*'s. In German, which has [ʁ] commonly and [γ] dialectally, confusion is lessened by the fact that [γ] is used for *g* and is always intervocalic.

The next step in the production of the sound is the sudden opening of the oral orifice, permitting an explosive emission of the dammed-up air stream. This may be effected in a number of ways: (1) The mandible may be depressed and the lips opened passively as a result of this movement; (2) the mandible may be held relatively fixed and the oral orifice opened by an elevation of the upper lip and a depression of the lower lip; or (3) both of these movements may occur together. The amount of depression of the mandible and eversion of the lips is a variable factor, the essential factor being a sudden separation of the lips. The manner of separation and the extent of the movement are

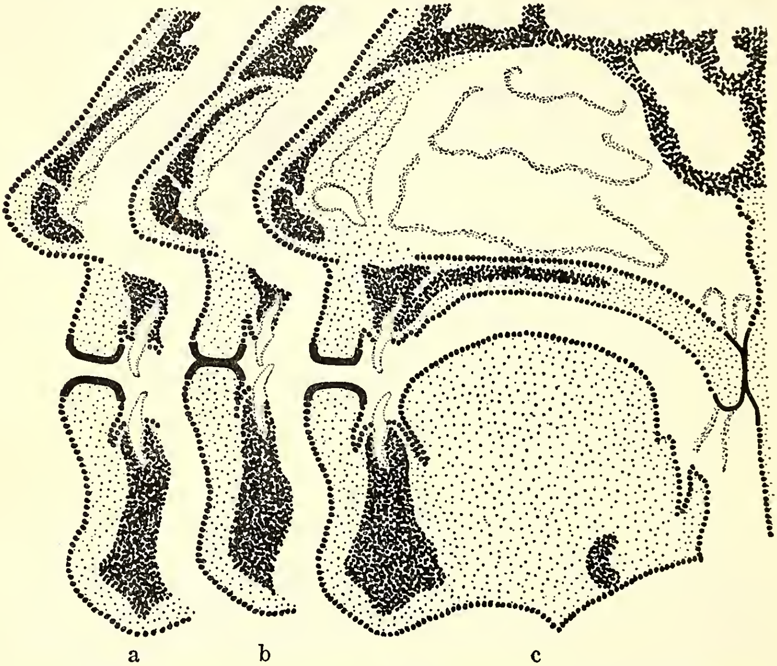

FIGURE 58.—The position for [b] and [p]. (a) Closing bilabial orifice; (b) position during implosion; (c) opening bilabial orifice, immediately after explosion.

not important. In the ordinary production of this sound, this separation is effected by a slight depression of the mandible (5–10 mm. from the neutral position) occurring simultaneously with a moderate eversion of both lips. Note, however, that the air pressure can also be released through the nasal cavities by a lowering of the velum, as in the Negro *seven* [sɛbm̩].

We may then summarize the events occurring in the ordinary production of [b] in isolation as follows: (1) Approximation of the vocal folds; (2) closure of the port into the nasopharynx; (3) a period of rising pressure within the mouth cavity; (4) slight increase in the firmness of contact between the two lips; and (5) sudden release of the impounded air, effected by a depression of the mandible and a moderate eversion of both lips, or by a dropping of the velum, the lips remaining in contact.

It will be seen that this sound can be readily divided into two parts: (1) The time interval between the approximation of the vocal folds and the opening of the oral orifice; and (2) the interval from the opening of the lips to the completion of the sound. The first is the period of implosion or rising internal pressure. The second is the period of explosion or falling pressure. We sometimes speak also of a third period between these two—a period of holding or "plosion," in which the mechanism is held fixed momentarily, just preceding the explosive phase of the sound. Unless the breath stream is also held momentarily, this period of plosion results in additional air pressure within the oral cavity. The period of plosion is lengthened, both for emphasis and to show double plosive consonants, as in *cab boy* [kæbːɔj] and *tubbed* [tʌbːd].

The auditory perception of either the implosive or explosive phase is accepted as standing for the whole sound. Thus, in the word *tub-full* [tʌbfʊl], only the implosive phase of the *b* is heard, the explosion being modified to the sound [f]. In the word *bat* [bæt], the explosion is the important factor. The approximation of the vocal folds and the opening of the oral orifice occur so nearly simultaneously that there is practically no acoustic effect from the implosive period. In each of these examples, only one part of the sound is actually heard, yet this is sufficient to cause a perception of the whole sound. In a word like *cabby* [kæbɪ̣], on the other hand, both implosive and explosive phases are present.

One more comment needs to be made relative to the sound [b]: It will be noted that when the whole sound is pronounced in isolation, the articulatory mechanism ends in position for the neutral vowel [ʌ]. As a matter of fact, it is more accurate to say that the tongue does not leave the neutral position during the production of the sound. Thus in some pronunciations, when the articulatory mechanism goes from the position of [b] to that of some vowel, there will be a tendency to introduce an approaching [ə] glide.

(2). [p] *as in Pat* [pæt] (*Voiceless Bilabial Plosive*). The movements involved in the production of this sound are, with one exception, exactly similar to those for the [b]. The difference lies in the fact that in the articulation of [p], the vocal folds are not approximated. The air stream passes through a relatively unrestricted glottal opening, thus producing a voiceless sound.

This means that no sound vibrations are produced during the implosive portion of the sound. When produced in isolation, the implosive period has no acoustic effect whatever. When only the implosive element of the sound is present in a word, as in *captain* [kæptən], the sound of [p] as a whole is perceived because of the acoustic effect produced by the cessation of the voiced element in the preceding vowel plus the accompanying closure of the lips. In [p], as in [b], the tongue remains in the neutral position. When only the explosive element of the sound is present, as in *pat* [pæt], the presence of the [p] is recognized by the acoustic effect of the sudden opening of the lips plus the short puff of unvoiced air that is emitted before the vocal folds are approximated in the production of the following vowel. In close phonetic transcription, this puff of air following a voiceless plosive is represented by [h], since it is made with the vocal folds open. It differs in one respect from the glottal fricative approach or termination: In the glottal fricative sound, the air escapes through the glottis while the articulatory mechanism is held constant, whereas in the puff of air following the voiceless plosives, the aticulatory mechanism is in movement. Realizing that the same basic principle is involved in both instances, the writers have, in narrow transcription, followed the practice of using the symbol [h] to represent an *h* approach through a fixed articulatory mechanism, and [ħ] to indicate the same approach through a moving articulatory mechanism. Thus in close transcription *pat* would be written as [pʰæt].[6]

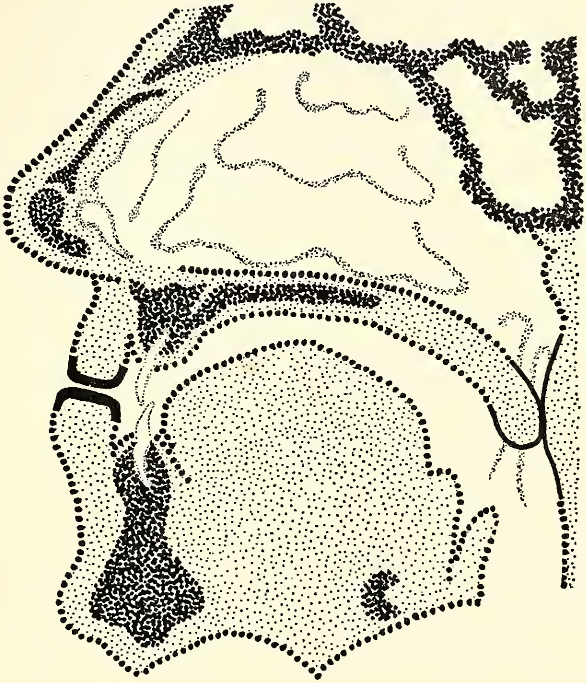

FIGURE 59.—The position for [β] and [ϕ]. This position can also be used as the point of origin or termination for [w] glides and as the point of origin for [ħw] glides.

The movements of the articulatory mechanism necessary for the production of the sound [p] are the same as those previously described for [b].

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[6] This puff of air following voiceless plosives is a characteristic of English not found in most languages. Consequently, foreigners almost always experience difficulty in learning the English plosives. The term *aspirated* is used to designate the presence of this puff of air following plosive sounds, and *unaspirated* to indicate its absence. These concepts are discussed in detail on page 247. In general, voiceless plosives in English are aspirated, but there are exceptions. These are summarized on page 249.

It is interesting to note in passing the close relationship between the voiced and voiceless bilabial plosives [b] and [p] and the voiced and voiceless bilabial fricatives [β] and [ϕ]. (See Fig. 59.) The two latter are foreign sounds found in Spanish and German. The only difference between the two pairs of sounds is that the former are plosives, whereas the latter are continuants. [β] and [ϕ] are made by forcing the air stream through a small bilabial orifice, with the result that friction noises are set up. Acoustically these sounds are very similar to [f], [v], and [w], and they are often confused. The [β] and the [ϕ] do not occur in English except in accidental combinations. Thus in the words *comfort* and *camphor*, some people follow the [m] by the voiceless bilabial fricative [ϕ] instead of the voiceless labio-dental fricative [f]. Thus these words become [kʌmϕɝ̣t] and [kæmϕɝ̣] or [kʌmpϕɝ̣t] and [kæmpϕɝ̣].

These words illustrate nicely the difference between an accidental sound and a phoneme. In German or Spanish where [ϕ] exists as a separate phoneme, this sound would be recognized as a separate symbol unit. In English, however, we do not have a [ϕ] phoneme so when it occurs accidentally, as it often does, we never notice it but think that we have produced the [f] sound. The German word *Pfennig* [ϕɛnɪç] and the Spanish *Havana* [ɑβɑnɐ] illustrate the two sounds.

We have now had occasion to mention all but one of the speech sounds whose production revolves about the lips. These sounds include a vowel, a glide, a plosive, a nasal, and a continuant fricative. The bilabial nasal sound [m] is to be discussed later. We may summarize as follows these speech sounds in which the action of the lips plays an important part:

Sound	*Voiced*	*Voiceless, or h Approach*
Vowel (plus tongue factor)	[u]	[hu]
Glide	[w]	[ħw]
Fricative Continuant	[β]	[ϕ]
Plosive	[b]	[p]
Nasal (plus velar factor)	[m]	

Although these are all lip sounds, they are not produced through exactly the same position, the size of the bilabial orifice varying from an opening large enough for a vowel, to a complete stop. The sounds are distinguished from each other, then, by two factors: the size of the bilabial orifice, and the type of movement employed. In only one sound, [u], does the tongue play a necessary part. The labio-dentals, [f] [v], [ɱ], [F], [ʋ] are closely associated sounds. It should be noted that no one language contains all of these sounds as phonemes, although practically all of them occur accidentally in every language. They cannot all be used as phonemes in one language because they are not sufficiently distinguishable from one another. For example, if a language contained words with different meanings pronounced [wɑt], [hwɑt], [vɑt], [ʋɑt] and [βɑt], it is evident that there would be considerable confusion.

dental occ

(3). [d] *as in Day* [dej] (*Voiced Lingua-alveolar Plosive*). Like the other plosives, this sound may be divided into implosive and explosive periods. Starting from the neutral position, the movements occurring in the implosive period are: (1) Approximation of the vocal folds; (2) closure of the port into the nasopharynx; (3) slight elevation of the upper, and depression of the lower, lip; (4) depression of the mandible to a point about half-way to the position for the neutral vowel [ʌ]; and (5) elevation of the tip and sides of the tongue so that a contact is made with some portion of the roof of the mouth in such a manner as to block completely the outward passage of the voiced air stream (Fig. 60).

All of these movements occur practically simultaneously. The amount of depression of the mandible is variable but some depression is essential to the production of an undistorted sound. An opening of the lips is also essential. For the most part, this orifice opens passively as a result of the depression of the mandible, but there is in addition some active eversion of the lips themselves. This active lip movement is not essential but it is probably always present.

The movements of the tongue may vary considerably so long as the air stream is completely blocked by a contact between the tongue and some portion of the anterior hard palate. Ordinarily, this is brought about by a broadening of the whole tongue and an elevation of the tip so as to make a contact on the alveolar ridge just posterior to the upper front teeth. At the same time, the whole dorsum of the tongue is raised somewhat, especially at the sides, which are elevated so as to lie in close contact with the inner borders of the teeth and with the alevolar ridge as far back as the last molars. This results in the formation of a relatively small cavity between the central portion of the tongue and the hard palate. This cavity is closed completely on both sides and in front so that the exit of the voiced air stream is momentarily blocked during the implosive period of the sound. The position for implosion may be held briefly to produce a period of plosion.

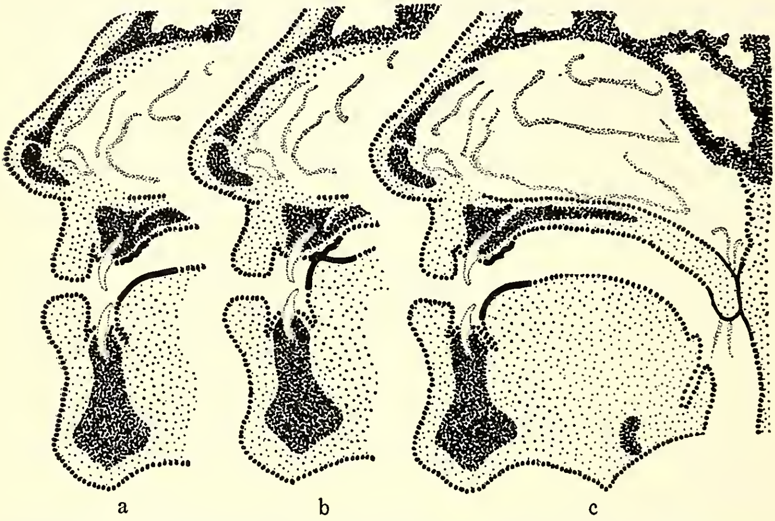

Figure 60.—The position for [d] and [t]. (a) Closing lingua-rugal orifice; (b) position during plosion; (c) opening lingua-rugal orifice, immediately after explosion.

The explosive phase of the sound begins with a rapid depression of the anterior part of the tongue, thus allowing a sudden escape of the dammed-up air stream.[7] At the same time, there is usually, though not necessarily, a further depression of the mandible to about the position of the neutral vowel [ʌ]. After the initial explosion, which is produced primarily by the tip of the tongue, the rest of that organ returns to the neutral position, or goes to the position of the following sound.

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[7] The sound may also be exploded laterally by releasing the contact made by the sides of the tongue, as in *saddle* [sædʟ̣], or it can be exploded nasally by lowering the velum, as in *sadden* [sædn̩].

When the sound is pronounced in isolation, the tongue returns to the neutral position and we hear an [ə] after the sound, thus, [d^{ə}]. Either the implosive or the explosive phase is sufficient to call forth recognition of the whole sound. Note the words *gadfly* [gædflɑj], *down* [dɑwn] and *caddy* [kædɪ̣].

The so-called dental *d*, [d̪], (see Fig. 61) is formed by a precisely similar action except that the contact made by the tongue is farther forward and lower—that is, on the inner and lower edges of the upper front teeth. The dental *d* is standard in Spanish, French, and Italian. Our nearest approximation to it in English occurs when [d] is preceded or followed by [z]. The [z] tends to pull the [d] farther forward and make it almost, if not entirely, dental. Note the words *lads* [lædz] and *raised* [rejzd]. The sound can also be made with the tip of the tongue behind the lower front teeth, in which case the blade makes the contact for the explosion. There is also a retroflex variety of *d*, symbol [ɖ] (see Fig. 62), in which the occlusion is made on the anterior hard palate.

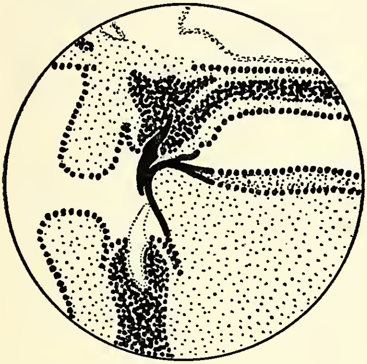

Figure 61.—Implosive position for dental *d* and *t*, [d̪] and [t̪].

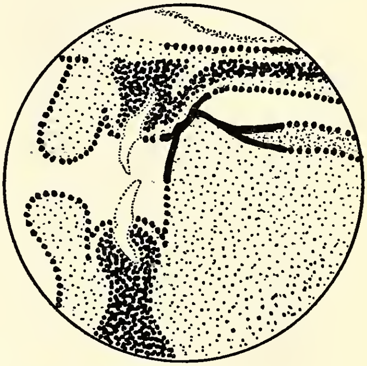

Figure 62.—Implosive position for retroflex *d* and *t*, [ɖ] and [ʈ].

dental

(4). [t] *as in Tell* [tɛl] (*Voiceless Lingua-alveolar Plosive*).[8] The movements occurring in the formation of the [t] are exactly the same as those for [d], except that the vocal folds are not approximated. Thus [t] is a voiceless sound. All discussion pertaining to [d] is equally applicable to [t]. [t], like [p], is usually followed in English by a voiceless puff of air which we represent by the symbol [ħ]. Exceptions to this statement are given on page 249.

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[8] The English [t] presents special problems for most foreigners. There are three differences between the typical English [t] and the sound as pronounced by many foreigners: (1) English [t] is articulated on the rugal ridge, whereas most languages use a dental *t;* (2) English [t] is aspirated, and many foreigners make the sound unaspirated; and (3) English [t] is usually articulated less vigorously than the foreign varieties of the sound. Of the three, the matter of dentality in the foreign

(5). [g] *as in Go* [gow] (*Voiced Lingua-velar Plosive*). This sound is likewise a plosive. It differs from [b] or [d] in that to obtain the acoustic effect of [g] the air stream must be blocked by an elevation of the back of the tongue in such a manner as to form an air-tight contact with the velum and the posterior hard palate (Fig. 63). We have noted that [b] involves a closure of the lips and [d] a closure formed between the tongue and the rugal ridge, or anterior hard palate. The third plosive, [g], involves a contact formed between the back of the tongue and the posterior hard palate, including part of the velum.

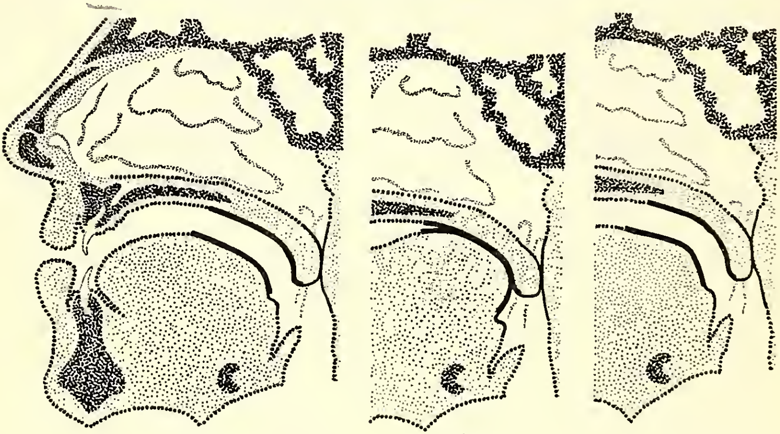

FIGURE 63.—The position for [g] and [k]. (a) Closing lingua-velar orifice; (b) position during implosion; (c) opening lingua-velar orifice, immediately after explosion.

The acoustic differences between [d] and [g] are probably due largely

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sound seems to be least important. A typical English [t] can be produced dentally, in fact is produced dentally many times by native speakers. The sound will not be typical in most contexts, however, if it is too vigorously articulated or if it is unaspirated. A dental *t* is nevertheless, a handicap, since most foreigners do not have the [θ] and the presence of a dental *t* makes [θ] doubly difficult to use habitually.

to the differences in the type of surface from which the explosion takes place and the size of the cavity into which the puff of air is emitted. Thus [d] explodes into a small front cavity. The explosion occurs as the tongue pulls away from the hard palate which is, in the main, a firm unyielding structure. [g], on the other hand, explodes into a large cavity, and the explosion takes place from the soft palate and from the other soft cushion-like structures that form the posterior walls of the mouth cavity. In the first sound, the explosion takes place as the air stream is emitted between the tongue and a relatively hard surface; in the second, the air stream passes between the tongue and a soft yielding structure. This fact may account for most of the acoustic differences between the two sounds.

The point of occlusion for [g] on the velum and hard palate may vary. Ordinarily we distinguish but two *g* positions, one at each end of the series. The front *g*, symbol [ɟ], marks the forward end of the series, i.e., the point farthest forward at which the tongue can still make a tight contact without involving the tip or blade (see Fig. 64). This is the sound as in *gear* [ɟɪr], *geese* [ɟis], etc. The front *g* is used regularly following or preceding the front vowels. The back *g*, symbol [g], marks the other end of the series, i.e., the point of greatest elevation and retraction of the back of the tongue to make a closure. Between [ɟ] and [g], there is a whole series of sounds, the exact positions of which are determined by the nature of the preceding or following vowel. In ordinary broad transcription the one symbol [g] is used to represent all of the sounds in the *g* series. In close transcription we can use [ɟ] to designate a front *g* and [g] for one formed farther back.

The position for [g] when it occurs in isolation, may be described as follows: (1) The vocal folds are approximated; (2) the port into the nasopharynx is closed; (3) the mandible is depressed to approximately the position of the vowel [ʌ]; (4) both lips are slightly everted to form an orifice similar to that for [ʌ]; and (5) the back of the tongue is elevated and retracted so that it establishes an air-tight contact with the velum and anterior fauces. The sides of the back of the tongue are in contact with the molar teeth. The whole tongue is elevated somewhat but the tip and sides of the forepart remain behind the lower front teeth.

Like other plosives, [g] has an implosive phase in which the voiced air stream is dammed up behind this closed position. This implosive phase may be prolonged to form a period of plosion. The last phase of the sound is the explosive period, in which the pressure is suddenly released. This release is effected as the tongue moves away from its point of contact into the position for the following sound. The explosion may occur laterally as in *wiggle* [wɪgḷ], or through the nasal cavities as in *signal* [sɪgŋnəl].

If, with the tongue in the position for [g], the sound is emitted as a fricative instead of a plosive, we have a voiced lingua-velar fricative sound, symbolized by [γ]. This sound is the voiced analogue of the German *ach laut.*

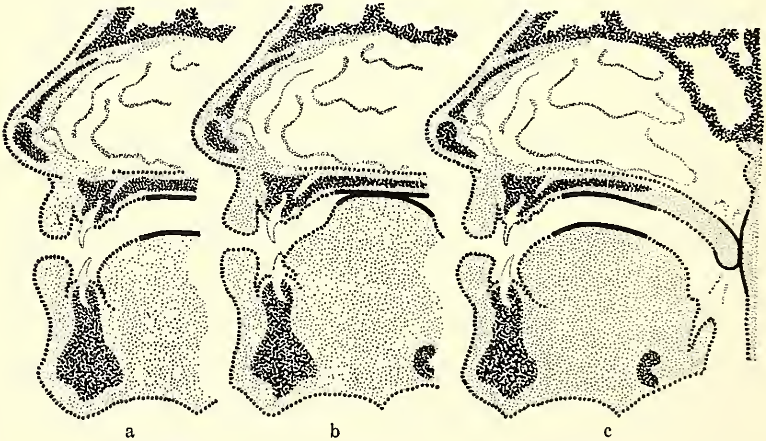

FIGURE 64.—The position for [ɟ] and [c]. (a) Closing lingua-palatal orifice; (b) position during implosion; (c) opening lingual-palatal orifice, immediately after explosion.

The articulatory position for [ɟ] is similar to that for [g] except for the position of the tongue. For [ɟ] the whole tongue, especially the back, is drawn forward so that its sides are in contact with the inner borders of the upper teeth and the corresponding lateral portions of the hard palate as far forward as the first premolars or canines. The forepart of the tongue is flattened and rests on the lower front teeth. The back of the tongue is still in contact with the soft palate but considerably farther forward.

[ɟ] is also a plosive. If a fricative is made in the same position, it is represented by the symbol [ᴊ]. This sound is the voiced analogue of the German *ich laut*. It is probably the starting point for certain [j] glides, as for example, *ye* [ji] and *years* [jɪrz].

The general discussion relative to the acoustic nature of the bilabial and lingua-alveolar plosives is also applicable to these back plosive sounds.

(6). [k] *as in Car* [kɑr] (*Voiceless, Lingua-velar Plosive*). This plosive sound may be described as the voiceless analogue of [g]. The voiceless fricative sound made through the same position is the German *ach laut* symbolized by [x]. [k] is usually aspirated in English, except in such words as *scan*, *skate*, *skim*, etc. See page 247 for additional information on aspiration.

The front *k*, symbol [c], is the voiceless analogue of the front *g*, [ɟ]. It occurs in such words as *key* [ci], *kin* [cɪn], etc. If a fricative sound is made in approximately the same position as that for [c], it becomes the German *ich laut*, symbol [ç].

The one symbol, [k], is commonly used to represent all of the series of *k*'s from front to back, [c] being used only in close transcription. The fricatives [x] and [ç], made in the back and front positions, respectively, are foreign sounds, occurring only accidentally in English.

From time to time we have described various sounds that employ what we have called an anterior lingua-palatal orifice, and other sounds produced with a posterior lingua-palatal or lingua-velar orifice. The posterior lingua-palatal orifice is formed between the back of the tongue and hard palate and velum. The anterior lingua-palatal orifice is formed between the forepart of the tongue and the anterior hard palate. The tip of the tongue must remain down in this latter position, the orifice being formed by an arching upward of the anterior portion of the dorsum of the tongue. If the tip of the tongue comes into play, the [t] and [d] or some variety of [ʃ] or [s] will be formed. Through each of these general positions, the anterior lingua-palatal and the posterior lingua-palatal, we can produce five different types of sounds, i.e., a vowel, a glide, a continuant fricative, a plosive, and a nasal sound, each of which may have either an unvoiced analogue or a glottal fricative approach. The nasal sounds are to be discussed later, but we include them here for the sake of completeness. The following chart shows the various sounds that can be made in these two positions:

	Anterior Lingua-palatal Position		Posterior Lingua-palatal Position	
	Voiced	*Voiceless or h Approach*	*Voiced*	*Voiceless or h Approach*
Vowel	[i]	[hi]	[u]	[hu]
Glide	[j]	[ħj]	[w]	[ħw]
Continuant				
Fricative	[ȷ]	[ç]	[γ]	[x̧]
Plosive	[ɟ]	[c]	[g]	[k]
Nasal	[ɲ]	—	[ŋ]	—

The vowel [u] involves an additional lip factor, and the nasal sounds require an opening of the soft palate. This outline is not to be interpreted as meaning that the various sounds listed are made in an exactly similar position. It is intended, rather, to show in a general way how different types of sounds are made through these two fundamental positions. The reader will note that all of the sounds listed except the continuant fricatives are used in English. For some reason, our language has not developed these particular fricative sounds as separate phonemes, although they may occur accidentally.

4. THE r PHONEME

No sound in the English language is more variable than the *r*. There are a great variety of *r* sounds, some of which are scarcely recognizable as that sound. We have already had occasion to mention the glide *r* and the vowel *r*. It seems best to attempt to draw together in one place all of the discussion pertaining to the *r* sounds. We are not concerned here with the sectional problem of the inclusion or omission of the *r* in certain combinations. We are, however, concerned with the variable pronunciations of the sound when it does occur.

r is a sound that, even more than *t*, *k* and *l*, is influenced by neighboring sounds. We will not be far wrong if we think of *r* as being dragged all over the mouth cavity by the various sounds with which it happens to be associated. This means that different sounds that we recognize as *r* are sometimes produced by fundamentally different movements. It is doubtful if we should speak of an *r* phoneme—rather, there are a series of *r* phonemes. These various *r* phonemes are only loosely bound together into one large phoneme. For some of the sounds the movements are of the same type; for others there may be a similar underlying acoustic factor in each case. Some of the *r* sounds, however, are so divergent that probably only their spelling causes them to be considered as *r*'s. There are listed below nine general types of *r* sound. All are made with the soft palate closed. All *r*'s are voiced sounds, although, as explained below, some members of the phoneme are partially unvoiced under certain conditions.

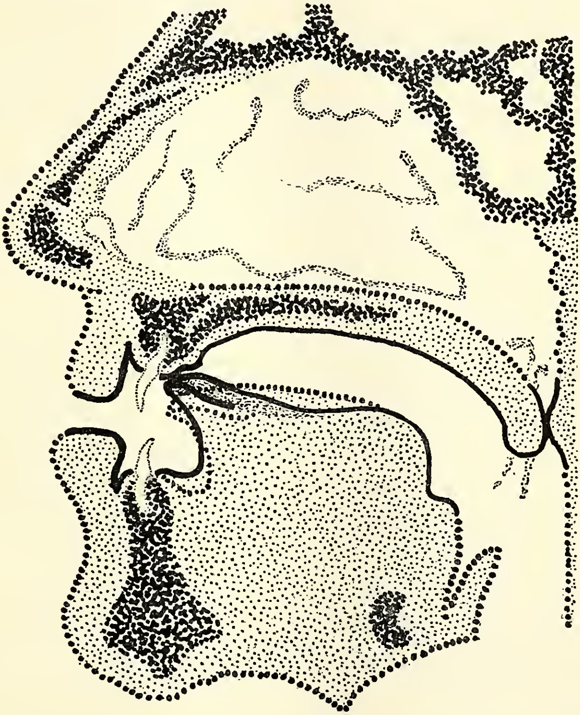

Figure 65.—The position for the trilled and one tap-trill *r*'s, [ř] and [ɾ].

(1). *The Rolled or Trilled Tongue-tip* r, *Symbol* [ř]. This *r* is made by a rapid succession of taps of the tip of the tongue against the upper teeth or teeth ridge (Fig. 65). It is not used in American English, but it does occur in some of the dialects of British English, as well as in some foreign languages.

(2). *The Semi-rolled or One Tap r, Symbol* [ɾ]. This sound is made by a single tap of the tongue against the teeth ridge (Fig. 65). It is very common in British English, and is sometimes used as a linking *r* in American speech.

(3). *The Fricative r, Symbol* [ɹ]. This *r* is characterized by the friction noises that are produced by the passage of the air stream through a narrow orifice formed between the tip of the tongue and the anterior hard palate (Fig. 66). The movements occurring in the production of the [ɹ] in isolation may be described as follows: (1) approximation of the vocal folds; (2) closure of the port into the nasopharynx; (3) depression of the mandible to a position similar to that for the sound [d]; (4) slight eversion of both lips; and (5) a forward movement of the whole tongue, a flattening of its forepart, and an elevation of the tip toward the anterior hard palate. The sides of the tongue lie in contact with the inner borders of the upper teeth as far forward as the first premolars. The lateral portions of the dorsum of the tongue are in contact with the corresponding parts of the hard palate. The tongue position for this sound is similar to that for an alveolar *d*, except that the tip of the tongue is not in actual contact with the anterior hard palate. In addition, the tip is retracted somewhat and curled back slightly so as to leave a narrow orifice for the passage of the air stream.

[ɹ] differs from [z] and [ʒ] in that the two latter sounds are made farther forward and their characteristic friction noises are produced mainly as the air stream passes over the teeth.

The fricative type of *r* occurs in its clearest form when it follows or precedes one of the lingua-dental or lingua-alveolar consonants, that is, [d], [ð], [z], [ʒ], and their voiceless analogues. These sounds all involve a movement of the tip of the tongue and are accompanied by definite friction noises. When one of them is followed or preceded by *r*, we tend to make the *r* as nearly as possible in the position of the accompanying sound. The easiest way to produce an *r* from the [d] position, for example, is to drop the tip of the tongue just far enough to produce the explosion of the [d] and then follow this by a slight retraction and curling upward of the tongue-tip to reach the [ɹ] position.

If the [d] follows the [ɹ], the principle works in reverse. The formation of an *r* following or preceding [z], [ð], or [ʒ] follows similar lines. In each case some of the friction noises of the accompanying sound are carried over to the [ɹ], and in addition the orifice for [ɹ] is narrow enough to produce friction noises of its own.

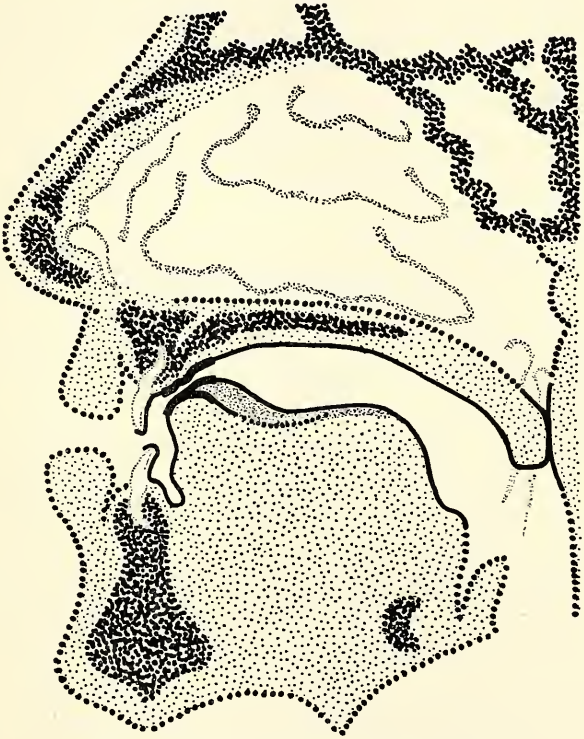

FIGURE 66.—The position for the fricative *r*, [ɹ].

Although the tongue position described above is typical of [ɹ], it is subject to variations in different individuals and in combination with different sounds. As a matter of fact, in a word like *dry* [dɹɑj], the tongue scarcely remains in the [ɹ] position long enough to justify calling the sound a continuant. It seems, rather, that the effect of the *r* is given as the articulatory mechanism goes through the [ɹ] position on its way from the [d] position to the [ɑj]. The [ɹ] can be produced as a continuant when it is pronounced in isolation, but it is not ordinarily so made. We may more accurately think of [ɹ] as one variety of the glide *r* that was discussed on page 118.

Strictly speaking, [ɹ] has no voiceless analogue. It is very nearly voiceless, however, when it occurs in combination with a voiceless consonant, as in *try* [tɹɑj], *thrive* [θɹɑjv], and *shrive* [ʃɹɑjv]. In such combinations, the voicing is not begun until the tongue has passed from the position of the initial consonant to the [ɹ] position and is ready to start the movement to the position for [ɑ]. Thus all but the very last portion of the glide is unvoiced. If, however, that very last portion is not voiced, the acoustic effect of the [ɹ] is so reduced that it is scarcely noticed.

(4). *The Vowelized r, Symbol* [ɝ]. This is the general American vowel *r*, previously discussed on page 80. In unstressed syllables it is represented by [ɝ]. We need not repeat the description of the movements made in producing this sound. It is a continuant made through a position sufficiently open to avert the formation of friction noises and hence is classified as a vowel (Figs. 21 and 22).

(5). *The Glide r, Symbol* [r]. This is the sound that we have described on page 118 as the glide *r*. The symbol is used to indicate a glide movement to or from the [ɝ] position. As we shall see later, there are other *r*'s that are glide sounds. We have, however, used this *r* that occurs before and after vowels as a typical and unmistakable glide *r*. We need not describe the movements for it any farther than to say that it will be either from the position of [ɝ] to some other vowel or vice versa. This *r* is not usually accompanied by friction noises, since the glide starts from a relatively open position. It is possible, however, to make the vowel [ɝ] through such a narrow opening that friction noises are set up around the orifice, thus giving it some of the quality of a continuant consonant. If the [ɝ] is so produced, glides to or from that position will likewise be partially fricative in nature.

In broad transcription, if any one symbol is to be used to represent all of the *r* sounds (except the vowel forms), it should be [r]. In close transcription the various symbols given in this discussion can be used as they fit most appropriately.

(6). *The Inverted or Retroflex r, Symbol.* [ɽ]. This *r* is simply a variation of the ones just described, and its position is the same except that the tip of the tongue is curled upward and backward toward the posterior hard palate (Fig. 67). It is thus a further modification of the [ɝ] position. There may be various degrees of retroflexing present in normal speech, although the retroflexing of [ɝ] and [r] is sometimes considered as one of the most undesirable features of Middle Western speech. Needless to say, the inverted position may be used in producing a vowelized form of the sound or as the point of origin in termination for glide movements. Retroflexing is symbolized by adding an upward curl to the right of the conventional symbol, thus, [ɽ].

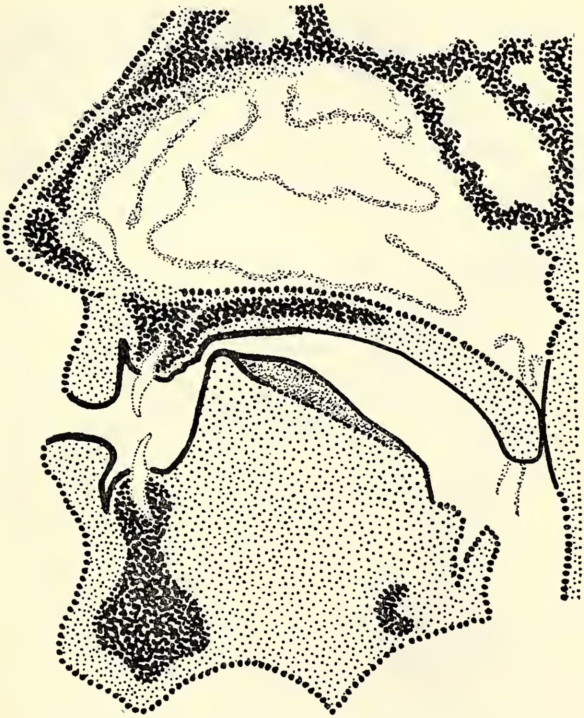

Figure 67.—The position for the retroflex *r*, [ɽ].

(7). *The Back r, Symbol* [Я]. We have noted previously that the *r* tends to be formed by the front of the tongue if it is in the neighborhood of any of the lingua-dental or lingua-palatal sounds, and by the mid-portion of the tongue when it is associated with vowels. It seems logical to suppose that an *r* might also be made with the back of the tongue when it is connected with some of the back sounds. This is often the case (Fig. 68). The [ꭆ] ordinarily occurs before or after [g] or [k]. It is a voiced sound but tends to be partially unvoiced when in combination with [k]. Just as the position for *g* may vary all the way from [g] to [ɟ], so may the position of the discharging orifice for the [ꭆ] vary through the same range of movements. While the [ꭆ] sound can be made initially, it usually occurs only in combination with [g] and [ɟ] or [k] and [c].

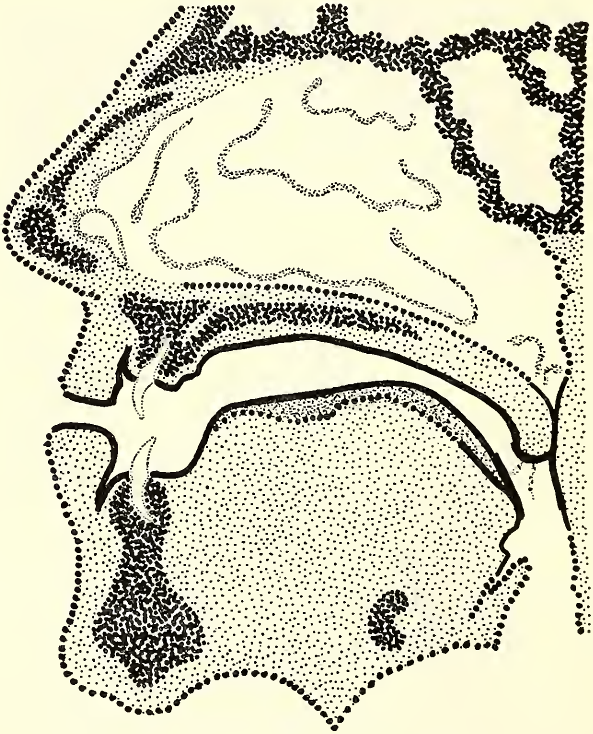

FIGURE 68.—The position for the back *r*, [ꭆ].

In the production of [ꭆ], the mandible is depressed slightly farther, and the bilabial orifice is somewhat larger, than is the case in the *r* sounds previously described. Otherwise, the main difference lies in the action of the tongue. The whole tongue is drawn backward and elevated, the front being elevated very little or not at all. Thus it is the back of the tongue that projects up into the mouth cavity in such a way as to produce the characteristic *r* resonance.

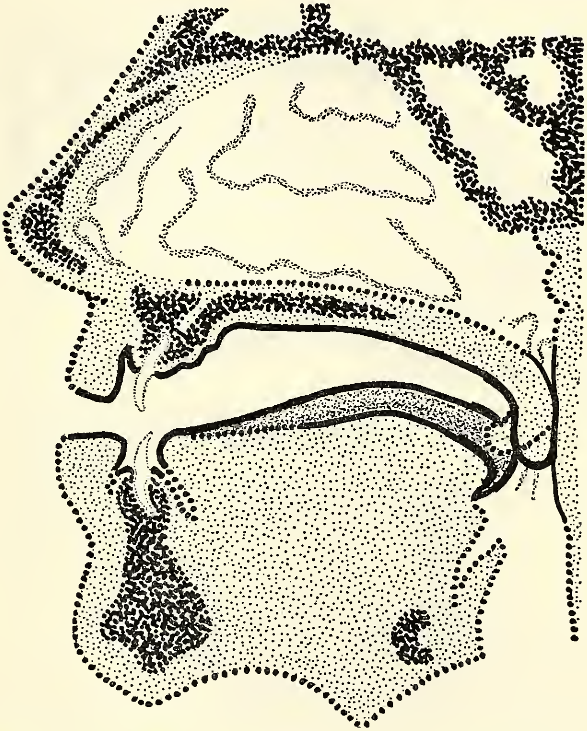

FIGURE 69.—The position for the uvular trilled and one tap uvular trill *r*'s, [Ř] and [R].

It is not safe to say that every *r* following or preceding a *g* or *k* will be a back [Я], because it is possible to use another type of *r* in these combinations. In general, however, most of us will tend to pronounce words like *grape* [gЯejp] and *crate* [kЯejt] with a back-tongue *r*. This sound is usually pronounced as a glide and not as a continuant.

(8). *The Uvular Rolled r, Symbol* [Ř]. This *r* does not occur in English but it does in several languages, notably German. As its name indicates, it is produced by raising the back of the tongue up toward the soft palate in such a way that the outward passage of the air stream causes the uvula to flutter (Fig. 69). The symbol [R], without the trill sign, [ˇ], is used to indicate the one tap, or flapped, form of the sound.

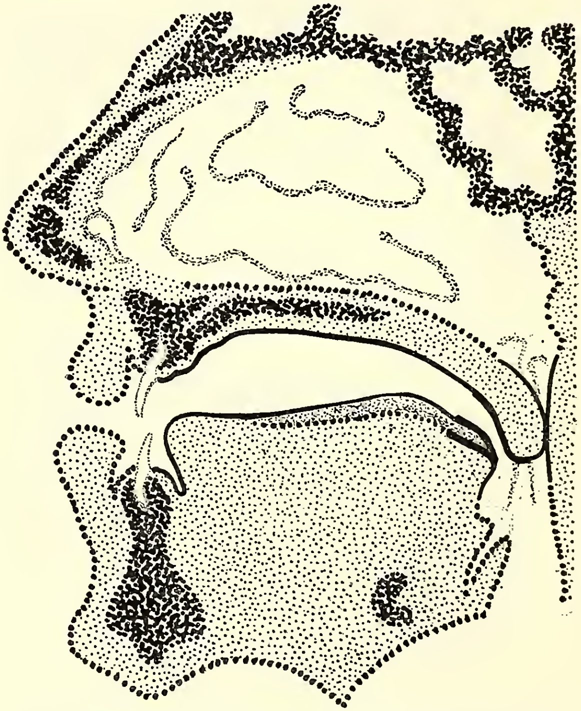

Figure 70.—The position for the velar fricative *r*, [ʁ].

(9). *The Velar Fricative r, Symbol* [ʁ]. This sound likewise does not occur in English, though it does in German. It is similar to the uvular rolled [Ř] except that the [ʁ] depends upon definite friction noises set up by the passage of the air stream between the back of the tongue and the velum (Fig. 70). The [ʁ] probably represents also an extreme form of the back-tongue [ᴙ] that we have mentioned just above. It is essentially a less vigorous form of the uvular *r*, the acoustic effect being that of a scrape instead of a flutter. The [R] and [ʁ] are frequently interchangeable in German.[9]

(10). *Summary of the r Sounds.* A review of the *r*'s discussed will show us that they fall into three main groups:[10] (1) the tongue tip *r*'s [ř], [ɾ], and [ɹ]; (2) the mid-tongue *r*'s [ɝ], [r], and their retroflexed forms; and (3) the back-tongue *r*'s [Я], [Ř], and [ʁ].

All of these sounds are grouped together into one large phoneme that is held together partly by a common spelling in the written language and partly by a common acoustic factor. Within this large phoneme we may think of other *r* phonemes based on the type of movement. Certainly, we can justifiably think of an [ɹ] phoneme, an [r] phoneme, and an [Я] phoneme—all within the main *r* phoneme each based upon a definite type of movement.

It is probable that in all of these *r*'s, the movement from the position of the sound to the following vowel is more important in giving the effect of the *r* than is the position from which the *r* starts. This is especially true of [ɹ], [r] and [Я], in which the acoustic effect of the *r* is primarily the result of movement from their respective positions or to them. A continuant made in the same positions will also give the effect of the *r*, but in actual speech the mechanism is not held fixed in one position long enough to produce a definite continuant, except in the case of the continuant vowel [ɝ].

5. SUMMARY OF THE CONSONANTS

We have now finished our discussion of the consonant sounds as oral modifications of the vowel sounds. Along with the laryngeal modifications and the intervowel glides they are methods of initiating, connecting, and terminating vowels. In order to clarify this conception, let us note, as an example, the word *satisfy* [sætɪ̣sfɑj]. Four vowel positions are involved, [æ], [ɪ̣] [ɑ] and [i]. We might represent the vowel basis of the word as [æ-ɪ̣-ɑ-i]. The word begins with the articulatory mechanism closed to the position for [s], then the mechanism opens to form [æ], closes again to the [t] position, opens to form the [ɪ̣], closes again for the [sf] and opens once more for the [ɑ] which is glided to the [i] position. We may well look at the consonants simply as methods of approaching or terminating vowel sounds.

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[9] The I.P.A. contains the additional symbol [χ], representing a voiceless form of [ʁ].

[10] Some writers describe also a labial trilled *r*.

We are now ready to consider the last general method of modifying the vowels, i.e., the nasal sounds. They are discussed in the next chapter under "Nasal Modifications."

Chapter 9

Nasal Modifications of the Vowels

Certain sounds in English are produced with the soft palate hanging relaxed and the port into the nasopharynx open. These sounds, the nasals, are continuants. They have, as a group, two essentials: (1) The oral cavity must be closed off at some point so that the vowel tone may not be emitted through the mouth; and (2) the soft palate must be open so that the tone can be directed through the nasal cavities. In discussing the consonant sounds we pointed out that it was necessary for the soft palate to be closed in the production of fricatives, plosives, and sibilants in order to direct the air stream into the mouth cavity and to close off the nasal cavities, thus making possible the creation of sufficient mouth pressure for the proper formation of the sounds. In the production of the vowels and nasals, however, the soft palate has a different function, i.e., to make available an additional resonance chamber and to change the coupling between resonance chambers.[1]

The individual acoustic properties of the nasal sounds depend upon the place of the stoppage of the oral cavity, which serves in the nasal sounds as a cul-de-sac resonator. The difference between one nasal sound and another depends upon how much of the oral cavity is serving in this manner.

Only three nasal sounds in English can be distinguished from each other. We usually list symbols for two other nasal sounds, but they are for use in close transcription only, and each has a close relative among the other three from which it is indistinguishable.

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[1] We are discussing in this chapter only the action of the velum as it operates to produce certain definite nasal sounds. We should also mention the possibility of nasalizing any or all of the speech sounds discussed in the preceding pages, that is, producing them with the port into the nasopharynx partially open. In French, vowels in certain positions are normally produced with considerable attendant nasality. We have previously pointed out that there is evidence to indicate that in English some normal speakers produce vowels with the soft palate slightly open. However, whenever this nasalization of either vowels or consonants becomes conspicuous, it is regarded as defective or as evidence of an undesirable form of dialectal speech.

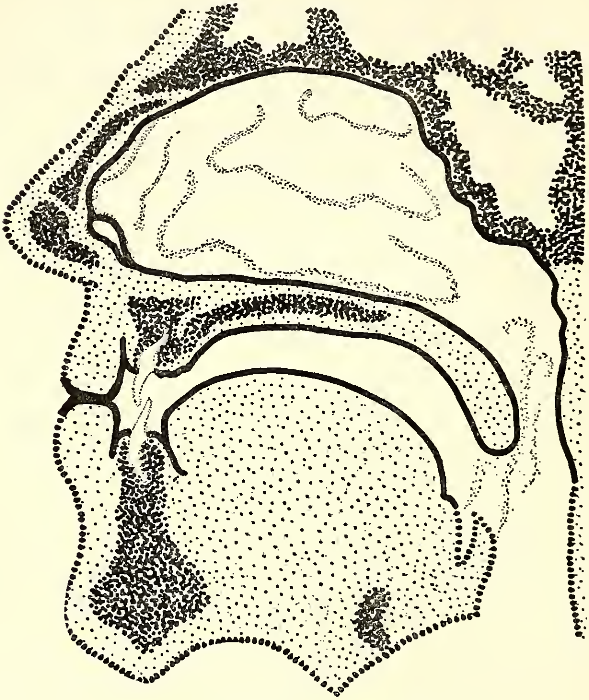

Figure 71.—The position for [m].

1. [m] as in Mat [mæt] (Voiced Bilabial Stop, Nasal Continuant)

Only one modification of the neutral position is necessary in producing the sound [m], namely, an approximation of the vocal folds adding the element of voice to the outflowing column of air. The whole articulatory mechanism remains in the neutral position, and the sound is emitted nasally (Fig. 71). This is the most easily produced speech sound in the English language.

In the production of this sound the tongue remains in the neutral position. However, it may execute a wide variety of movements or assume a number of different positions without altering the essential nature of the sound. Apparently the one factor limiting its movement is that the whole length of the oral cavity must be available as a resonator. Thus, if the front of the cavity is blocked off by the tip, or the whole cavity by the back of the tongue, the resulting sounds are recognized as belonging to different phonemes. The position for [m] is the position for the plosive phase of [b] except that the soft palate is open and the sound is emitted nasally.

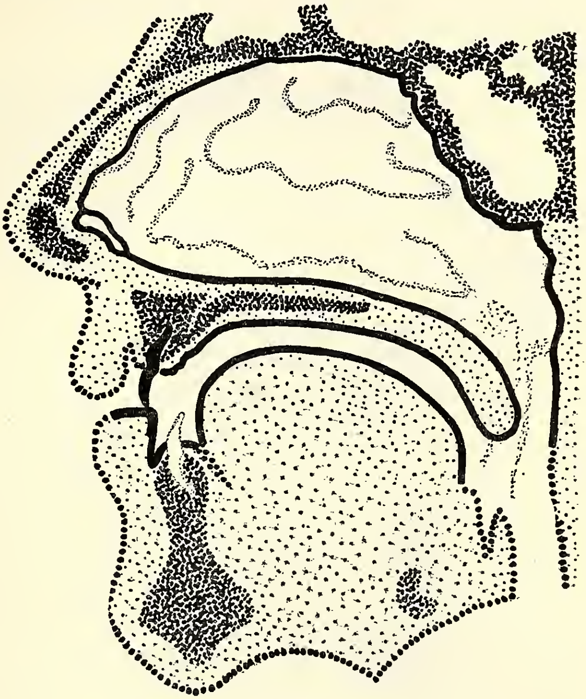

FIGURE 72.—The position for [ɱ].

The symbol [ɱ] is sometimes used to represent a labio-dental *m* (see Fig. 72). Such a sound sometimes occurs accidentally in such words as *caveman* [kejvɱæn]. The nasal sound following the labio-dental [v] tends to be made with the same lip-teeth position. The [ɱ] and the [m] cannot be distinguished acoustically.

2. [n] AS IN NONE [nʌn] (VOICED LINGUA-ALVEOLAR STOP, NASAL CONTINUANT)

The movements involved in the production of [n] are exactly the same as those for the plosive phase of [d], except that the port into the nasopharynx remains open and the voice is emitted through the nasal cavities (Fig. 73).

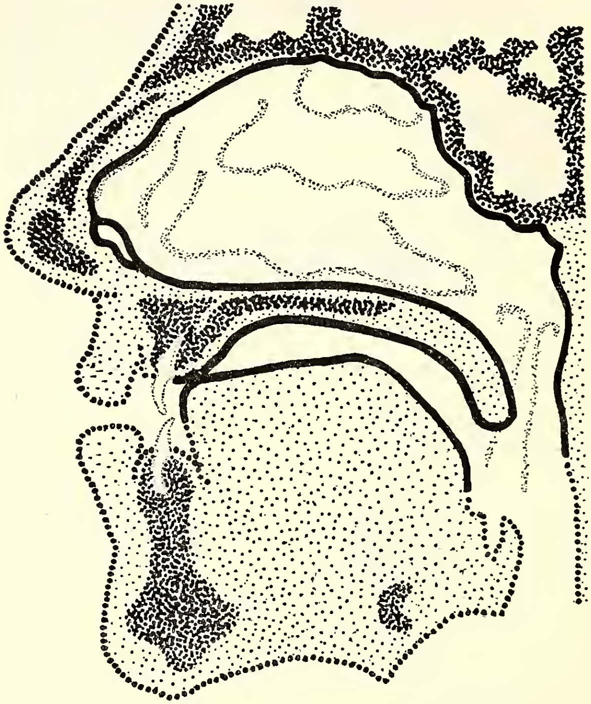

FIGURE 73.—The position for [n].

The articulatory mechanism must remain in this position throughout the duration of the sound. When the [n] is final, the position is maintained until the cessation of voice, i.e., until the drawing apart of the vocal folds, after which the mechanism returns to the neutral position. When the [n] is initial or medial, the tongue moves toward the position of the following sound simultaneously with the closure of the palate.

All discussion of the movements of the tongue, lips and jaw during the plosive period of [d] is applicable also to [n].

[n] and [m] are usually considered as consonants but they sometimes stand alone in a syllable and have considerable vowel quality. Note the words *chasm* [kæzm̩] and *mutton* [mʌtn̩]. Final, syllabic nasals have often been called vowels. We should note, however, that the only difference between the consonantal *n* in *no* [now] and the vowel *n* in *button* [bʌtn̩] is one of time. The size of the discharging orifice is ordinarily the distinguishing factor between vowels and consonants, since it determines the presence or absence of friction noises. With the nasals, however, the orifice remains constant and the only thing that can vary is the time. If the duration of the nasal sound is short, we call it a consonant; if long, a vowel.

3. [ŋ] AS IN LUNG [lʌŋ] (VOICED LINGUA-VELAR STOP, NASAL CONTINUANT)

This is the [g] sound emitted nasally as a continuant. Its position is the same as that for the plosive phase of [g], except that the port into the nasopharynx is not closed (Fig. 74).

In a similar fashion, the nasal emission of the [ɟ] results in another nasal continuant, the symbol for which is [ɲ] (see Figure 75).[2] Strictly speaking, a whole series of nasal sounds lies between [ɲ] and [ŋ], just as there is a series of voiced plosives between [ɟ] and [g]. They are not distinguishable from one another acoustically. [ŋ] is the symbol used in broad transcription.

4. SUMMARY OF THE NASAL SOUNDS

We have seen that [m] depends upon the use of the whole mouth cavity as a cul-de-sac resonator. [n] depends upon that part of the cavity that lies behind the lingua-alveolar contact made for this sound. For [ŋ], on the other hand, the mouth cavity is entirely cut off by the contact made between the back of the tongue and the soft palate, and the only cul-de-sac resonator that remains is the faucial entrance.

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[2] The symbol [ɲ] is sometimes used to represent the sound of *gn* as in *champagne* (French) and *montagne* (Italian). The sound is a rapid [j] glide beginning from the [ɲ] position and made with the soft palate open. An approximation of the sound is heard in some pronunciations of *signal*, i.e., [sɪgɲj̃əl]. The I.P.A., however, lists the symbol [ɲ] simply as a palatal nasal.

There is little point to a discussion as to whether these sounds should be thought of as consonants or vowels. It is simpler to think of them as nasal sounds. They provide one of the methods of initiating, connecting, or terminating vowel sounds.

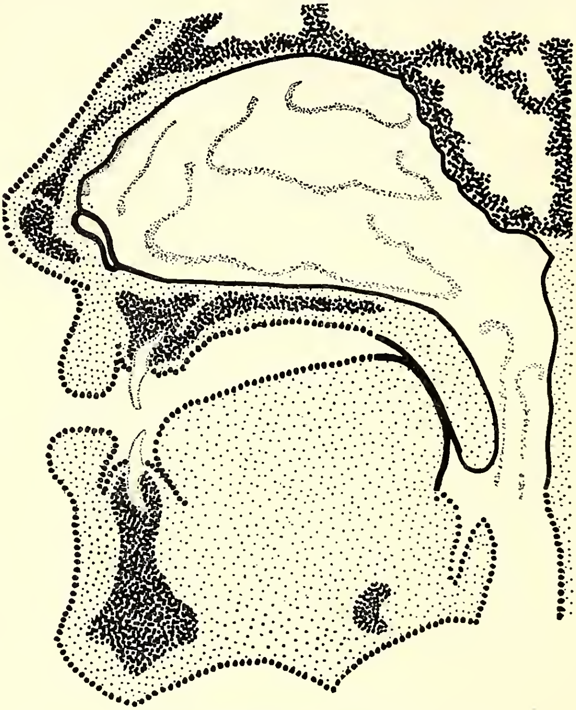


Figure 74.—The position for [ŋ].

5. Summary of the Methods of Initiating, Connecting, and Terminating Vowels

It will be recalled that we began this section with a consideration of the neutral position of the speech mechanism and the neutral vowel [ʌ]. We next described the vowels of English and found that in terms of movement, they grouped themselves into front vowels, mid vowels, back vowels, and laterally emitted vowels. We proposed then to view the remaining sounds of speech as ways and means of starting and stopping these basic vowel tones. We began with a consideration of the results of the actions of the vocal folds, including the glottal fricative, the glottal vibratory, and the glottal plosive approach and termination. We next considered the glide movement as a method of connecting one vowel with another. We spoke of receding and approaching glides centering around the five key positions of [u], [i], [ɝ], [ʟ], and]ə]. This brought us to a study of the consonant sounds under the general heading of oral modifications of vowel tones. These consonants were divided on the basis of movement into continuant fricatives and stop plosives. Finally, we discussed under nasal modifications the nasal sounds [m], [n] and [ŋ].

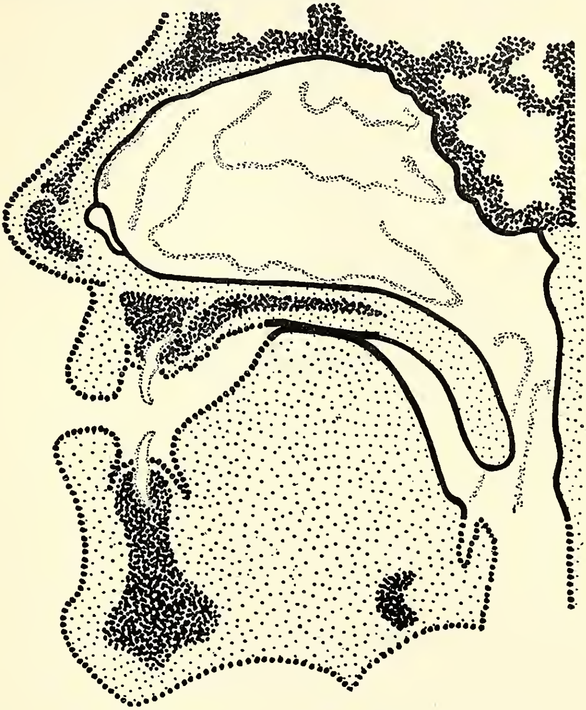


FIGURE 75.—The position for [ɲ].

It is probably quite evident by this time that just as glides, consonants, and nasal sounds can be used to initiate or terminate vowel sounds, so they can be used to initiate or terminate each other. Our next task is to consider briefly the methods of initiating, connecting, and terminating glides, consonants, and nasal sounds.

Chapter 10

Methods of Initiating, Connecting and Terminating Glides, Consonants and Nasal Sounds

1. Glides

It is obvious that exactly the same principles will apply to the glides as to the vowels. Like a vowel, a vowel glide may have a glottal fricative, glottal vibratory, or glottal plosive approach. Examples of the receding glides are: *ouch* (which might be either [ɑwtʃ] or [ˀɑwtʃ]) and *how* [hɑw]. As approaching glides, we may cite such words as *way* [wej] as an example of a glottal vibratory approach and *whey* [ħwej] for the glottal fricative approach. It is interesting to note that we do not ordinarily have a glottal plosive approach to these approaching glides. The reason is easily found: A glottal plosive approach forces an emphasis on the initial sound, and in approaching glides, the initial sound is unstressed. Thus, the two are not compatible. As a matter of fact, when we wish to emphasize an approaching glide combination, we do it by placing extra stress on the stressed vowel of the pair. For example, if we wished to stress a phrase like *way up*, we would give extra force and duration to the definite vowel [e] in the first word, and perhaps initiate the second word with a glottal stop, thus: [weːj ˀʌp]. In a similar fashion, vowel glides may have a glottal fricative, vibratory or plosive termination. Receding glides, however, such as *bow* [bow], cannot readily have a glottal plosive termination.

We have previously mentioned that two glides may be connected by a glottal fricative, a glottal plosive, or by glides between glides. Thus in *playhouse* [plejhɑws] the glides [ej] and [ɑw] are connected by an *h*. In a phrase, such as *I eyed* [ɑjˀɑjd], we frequently use a light glottal stop to avoid [ɑj jɑjd]. Glides between glides are illustrated by such words as *our way* [ɑwrwej] and *bow wow*]bɑwɑw].

Glides may likewise be initiated, connected, or terminated by consonants and nasals. Examples: *pay* [pej], *ape* [ejp]; *say* [sej], *ace* [ejs]; *may* [mej], *aim* [ejm]; *so so* [sowsow] and *no no* [nownow].

2. Consonants

(1). *The Glottal Fricative, Vibratory or Plosive Approach or Termination to Continuant Consonants.* Although we do not ordinarily look at consonants from this point of view, it is obvious that continuant consonants can be initiated or terminated by the same laryngeal modifications as the vowels. Thus in the word *zoo* the [z] ordinarily has a glottal vibratory approach. It could, however, be approached from a glottal stop position. Strictly speaking, there is no glottal fricative approach to such a consonant. In one sense, however, we may regard an [s] as an *h* approach to a [z] in a combination like [szu]. Such combinations do not appear initially in English, but something very similar to it does appear frequently in words ending in [z]. For example, in the word *classes,* as it is commonly pronounced, the final [z] fades out into an [s] so that the word would be written in close transcription as [klæsɪ̣z^{s}]. This could be called a glottal fricative termination. Such a final continuant consonant might likewise have a glottal vibratory or plosive ending. However, we shall find (see paragraph 3 below) that when continuant consonants are to have a plosive approach or termination, it is usually an oral rather than a glottal plosion.

(2). *Interconsonantal Glides.* Continuant consonants, like vowels, may be connected by a glide type of movement, especially if the positions of the two sounds are close together. These may not be glides in quite the same sense as those that occur between vowels but at least they are based on the same general principle of economy of effort. Note the words, *fifths* [fɪfθs], *lives* [lɑjvz], *paths* [paðz], etc.

(3). *The Oral Plosive Approach or Termination for Continuant Consonants.* Just as a stop sound may be used as a method of beginning or ending a vowel, so it can be used to begin or end a continuant consonant. Note the words *best* [bɛst] and *bets* [bɛts]. In the first, the continuant fricative [s] is brought to a termination by the stop, [t]; in the second, the [s] starts from the [t] position. Sound combinations like these are often called *affricates* and there are many such examples in the language. We have called this the oral plosive approach or termination. We can best illustrate this approach by speaking in detail of the combination [tʃ].

We should say in the beginning that [tʃ] and its voiced analogue [dʒ] have been commonly described by phoneticians as separate sound units made by combining [t] and [ʃ] and [d] and [ʒ], respectively. Such a description is not entirely accurate. Evidence from palatograms indicates that the initial position in the [tʃ] combination is somewhat different from that of the [t] when that sound is pronounced in isolation.

The initial position for [tʃ] is closer to that for [ʃ], except that the narrow orifice between the flattened tip of the tongue and the anterior hard palate which was noted for [ʃ], is now completely closed by a slight additional elevation of the tongue tip. Thus the sound has an explosive beginning from what might be called a closed [ʃ] position. On the other hand, the position might equally well be described as one of a variety of *t* positions.

There is also a difference in the manner of effecting the explosion from this closed position. We have noted that when [t] is sounded in isolation, the whole tongue is depressed suddenly to the neutral position, resulting in a sudden release of the dammed-up air stream. In [tʃ], however, the front of the tongue drops relatively slowly from the closed [ʃ] position to form momentarily the typical lingua-palatal orifice previously described for [ʃ]. Following this, the whole tongue is depressed to the neutral position. The acoustic effects of this series of movements are as follows: (1) With the depression of the tip of the tongue, there occurs a modified explosion that is usually less sharp and clear-cut than that for [t]. (2) As the tongue passes through the [ʃ] position, there is a brief period when the friction noises characteristic of that sound are produced. (3) Finally, the depression of the whole tongue results in the escape of a puff of air. Put together in rapid succession, this all results in the [tʃʰ] as it is pronounced in isolation.

Apparently, then, there are two factors of difference between [tʃ] and [t]. In the first place, the initial tongue position differs slightly. In the second place—and this seems to be by far the more important factor—there is a difference in the nature of the movement that opens the orifice. Starting with the tongue in the closed [ʃ] position, the sound resulting from the opening movement can be made to resemble either a

[t] or a [tʃ] depending upon the way in which the opening is made.

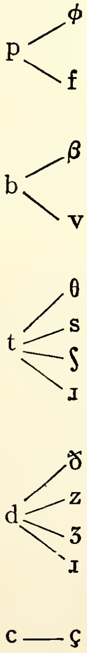
Whether [tʃ] should be described as a separate sound or as [t] plus [ʃ] or as [ʃ] started from a closed position, is a matter that need not be settled here. The writers feel, however, that [tʃ] is no more a symbol unit than is [ts]. It seems simpler to think of [tʃ] simply as an oral plosive approach to the [ʃ]. The [dʒ] combination may be mentioned in passing as the voiced analogue of [tʃ].

Other combinations are formed according to the same general principles. Thus, [ts] as in *cats* [kæts], [dz] as in *fads* [fædz], [tθ] as in *eighth* [ejtθ], [dθ] as in *width* [wɪdθ] and [dð] as in *around the* [ərɑwndðə] may be noted in this connection. These combinations are similar in nature to [tʃ] and [dʒ]. We are not interested here in a detailed description of each of these combinations. The same working principles described for [tʃ] are applicable in each case. By way of summary, we may say that each of the continuant fricatives [s], [θ] and [ʃ] along with their voiced analogues may have an explosive or *t* attack, i.e., they may be approached from the closed position of the fricative under consideration. This we have called the oral plosive approach. In a similar manner, the fricative *r* [ɹ] may have a *t* approach as in *try* [tɹɑj].

Each of these fricatives may likewise have a *t* termination, that is, it may end in a closed position. Note for example, the [s] in *cast* [kast], the [z] in *razed* [rejzd], [ʃ] in *rushed* [rʌʃt], [ʒ] in *waged* [wejdʒd], [θ] as in *lathed* [læθt], [ð] as in *bathed* [bejðd] and [r] as in *heart* [hɑrt]. In each of these cases the fricative ends in the closed position of the sound under consideration, instead of beginning from it. Note, especially, the word *waged* in which the [ʒ] sound has both its beginning and ending in the closed position. These are examples of oral plosive terminations.

Although we have limited our discussion to the lingua-palatal and lingua-dental sounds, it will be seen that the same principles can be applied at any point in the articulatory mechanism *where plosives and fricatives are formed in the same region.* Thus the voiced and voiceless lingua-velar plosives [g] and [k] and the voiced and voiceless lingua-velar fricatives [γ] and [x] can be combined to form [kx], [xk], [gγ] and [γg]. In a similar fashion, [p] and [b] may be combined with the voiced and voiceless bilabial fricatives [β] and [ϕ] to form [bβ], [βb], [pϕ] and [ϕp]. These combinations occur only accidentally in English but they may be common in other languages. Note the German word *pfennig* [φɛnịç], often pronounced [pφɛnịç].

We may summarize this discussion of the oral plosive approach or termination by saying again that it may occur at any point in the articulatory mechanism where plosives and fricatives are made by similar adjustments of the articulators. If we divide the [k] [g] phonemes into front and back sounds there are four such points where clusters of plosives and fricatives occur. They are: the bilabial cluster with [p] and [b] as the plosive sounds; the lingua dental cluster with [t] and [d] as the plosives; the [c] [ɟ] cluster and the [k] [g] cluster. These are shown in diagram below with their respective clusters of fricative sounds. The various oral plosive combinations are given on the right.



Oral Plosive Approach	*Oral Plosive Termination*
pφ	φp
pf	fp
bβ	βb
bv	vb
tθ	θt
ts	st
tʃ	ʃt
tɹ	ɹt
dð	ðd
dz	zd
dʒ	ʒd
dɹ	ɹd
cç	çc

		Oral Plosive Approach	*Oral Plosive Termination*
ɟ	J	ɟJ	Jɟ
k	ᴙ	kᴙ	ᴙk
	x	kx	xk
g	ᴙ	gᴙ	ᴙg
	γ	gγ	γg

We should mention also that one member of an affricative pair may be voiced and the other unvoiced. Such combinations seldom occur in English except accidentally.

For purposes of broad transcription, it is permissible to write these affricates simply as pairs of sounds, [tʃ], [dʒ], [st], [ts], etc. The oral plosive nature of the combination is assumed. However, in narrow transcription, it is better to use a ligature, thus, [t͡ʃ], [s͡t], etc., to indicate the organic union of the two sounds. The ligature is also occasionally necessary to avoid ambiguity. The basic difference between a mere juxtaposition of two sounds and their union in an affricate combination is shown by the classic examples of [bɑjt ʃip] vs. [bɑj t͡ʃip].

3. The Incidental [ħ]

Theoretically, an [ħ] will be produced after every voiceless consonant followed by a vowel or glide sound, since the vocal folds pass from an open to a vibrating position in every such combination. Thus in the words *so, show, toe,* and *foe,* [s^{ħ}ow], [ʃ^{ħ}ow], [t^{ħ}ow], [f^{ħ}ow], there is in each case a suggestion of an [ħ] between the consonant and the following glide. The fact that the [ħ] is not ordinarily recognized in these words, whereas it is prominent in *knighthood* [nɑjtħud] and *exhale* [ɛksħejl] seems to be due entirely to a difference in stress, that is, the amount of force behind the breath impulse and the length of time which it occupies. We have called this sound the incidental [ħ], since it is not a symbol unit and occurs only as a transitional sound. This [ħ] will occur when there is a movement from the position of a voiceless plosive or continuant consonant to that of a vowel, *if* the voicing does not begin until the mechanism has assumed the position of the following vowel.[1] The same type of [ħ] will occur in a lesser degree if the conditions are reversed and the movement is from a vowel to a voiceless continuant or plosive consonant, providing that the voicing ceases the instant the mechanism moves from the vowel position. (See the discussion of aspiration, page 247.) The reader should refer again to the discussion of the [ħj] and [ħw] glides in connection with the glide sounds.

4. THE INCIDENTAL [ə]

We have already pointed out that certain voiced plosives and fricative consonants are followed by an [ə] sound. This is particularly true of [b] and [v], since the tongue is in the neutral position for these sounds. Thus *bad* and *cab* in close transcription are sometimes [bᵊæd] and [kæᵊb]. This incidental [ə] sound occurs if and when the tongue passes through the neutral position on its way from the consonant to the following vowel or from the vowel to the consonant. Its presence accounts for many schwa glides.

5. THE NASALS

The nasal sounds may have a glottal fricative, vibratory, or plosive approach or termination, although in conventional speech they are initiated only by the second method. Obviously, the nasals may also be started and stopped by the consonants. There may also be internasal glides, such as are present in certain pronunciations of *coming*, *singing*, etc. ([kʌmn̩], [sɪŋn̩]), and in such phrases as *come now* [kʌmnɑw] and *ten men* [tɛnmɛn].

One interesting illustration of a glottal fricative and a glottal plosive approach to a nasal sound is supplied by our expressions [m̩ːhm̩ː] meaning "yes" and [ˀm̩ˀm̩] meaning "no." It is one instance in English where a glottal stop does have symbolic significance.

The oral plosive approach and termination is used frequently with [m] and [n]. Thus in *cotton* [kɒtn̩] and *captain*]kæpm̩], (dialectal) there is an oral plosive approach; while in *cant* [kænt] and *camp* [kæmp], there is an oral plosive termination to the respective nasal sounds.

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[1] In certain types of sound combinations (see page 249), particularly when a voiceless plosive is preceded by *s*, voicing does begin immediately following the explosion, and the *h* puff is omitted. Examples: *span, stand, skim.*

	Approximation of Vocal Folds	*Elevation of Soft Palate, Dropping of Mandible*	*Modifications of Neutral Vowel Position to Produce Other Vowels Through Orifices Large Enough to Avoid Friction Noises*
Resting State of Speech Mechanism as in Normal Quiet Respiration	Laryngeal	The	The front vowels [i] [ɪ] [e] [ɛ] [æ] [a]
	tone	neutral	
	as in	vowel	
	[m]	[ʌ]	The central vowels [ɝ] [ɜ] [ʌ] [ɑ]
			The back vowels [u] [ʊ] [o] [ɔ] [ɒ]
			The schwa vowels [ə]
			The laterally delivered vowels [ʟ] to [ᴌ]

<table>
<tr><th></th><th>Ways of Initiating, Connecting or Terminating the Vowels</th><th>Ways of Initiating, Connecting, or Terminating Glides, Consonants, and Nasal Sounds</th></tr>
<tr><td></td><td>LARYNGEAL APPROACH OR RELEASE
Glottal fricative [h]
Glottal plosive [ʔ]
Glottal vibratory —</td><td></td></tr>
<tr><td></td><td>INTER-VOWEL GLIDES
Approaching and Receding glides [w]
[j]
[l-ɫ]
[r]
[ə]</td><td>Glottal fricative [ħ]
Glottal plosive [ʔ]
Glottal vibratory
Glides between glides
Consonants
Nasals</td></tr>
<tr><td></td><td>ORAL MODIFICATIONS
<table>
<tr><th colspan="2">Stops (plosives)</th><th colspan="2">Continuants (fricatives)</th></tr>
<tr><th>Voiceless</th><th>Voiced</th><th>Voiceless</th><th>Voiced</th></tr>
<tr><td>[p]</td><td>[b]</td><td>[ϕ]</td><td>[β]</td></tr>
<tr><td>[t]</td><td>[d]</td><td>[f]</td><td>[v]</td></tr>
<tr><td>[c]</td><td>[ɟ]</td><td>[θ]</td><td>[ð]</td></tr>
<tr><td>[k]</td><td>[g]</td><td>[s]</td><td>[z]</td></tr>
<tr><td></td><td></td><td>[ʃ]</td><td>[ʒ]</td></tr>
<tr><td></td><td></td><td>[ç]</td><td>[ʝ]</td></tr>
<tr><td></td><td></td><td>[x]</td><td>[γ]</td></tr>
</table></td><td>Inter-consonantal glides
Glottal fricative, vibratory or plosive approach or termination
Incidental [ħ]
Incidental [ə]
Oral plosive approach or termination:
[ts] [tʃ] [tθ] [tɹ]
[dz] [dʒ] [dð] [dɹ]
[pϕ] [bβ]
[kx] [gγ], etc.</td></tr>
<tr><td></td><td>VELAR MODIFICATIONS
[m]-[ɱ]
[n]
[ɲ]-[ŋ]</td><td>Inter-nasal glides
Glottal fricative, vibratory, or plosive approach or termination
Oral plosive approach or termination [tṇ] [bṃ] [nt] etc.
Consonants.</td></tr>
</table>

Chapter 11

A Summary of Kinesiologic Phonetics

1. Outline Analysis of Speech Sounds

In developing this classification of speech sounds, we have used as a starting point the resting state of the speech mechanism. The vowel [ʌ] was discussed as resulting from minor changes in this position and the rest of the vowels as further modifications of the position for [ʌ]. The various ways in which these vowel tones can be initiated, connected, or terminated were then considered, under the headings of laryngeal modifications, glides, oral modifications, and velar modifications. And finally, the ways in which these glides, consonants, and nasals may themselves be initiated, connected or terminated was briefly indicated. For the sake of clarity, this approach is summarized in outline form (pp. 178-179). This outline is an attempt to show in a single chart the approach used in this section of the book. It should prove useful in reviewing the material covered.

2. A Reclassification of Speech Sounds from the Placement Approach

The discussion in Section II, developed from a kinesiologic approach, has included a classification of speech sounds as continuants, stops, and glides, and descriptive names for the consonants that indicate the positions of the articulatory mechanism. In order to review this material from a slightly different angle, a second classification of speech sounds will now be suggested, based *entirely* upon the position of the articulatory mechanism. Upon this basis, the sounds already described are divided into nine groups: the beta consonants, the delta consonants, the gamma consonants, the glottal sounds, the glide sounds, the front vowels, the mid vowels, the back vowels and the laterally emitted vowels. Each of these groups will be discussed in more detail.

(1). *The Beta Consonants.*[1] These include those sounds in which the lips are the articulators and the tongue plays only a neutral or passive role. They are [p], [b], [m], [ϕ], [β], [f], [v], and [ɱ].

(2). *The Delta Consonants.* The delta family includes those in which the tip of the tongue plays against the teeth or the anterior hard palate and in which the lips have only neutral or passive roles. These sounds are [t], [d], [n], [s], [z], [θ], [ð], [ʃ], [ʒ], [ɹ], [ř] and [ɾ].

(3). *The Gamma Consonants.* The gamma group is a small one in English, embracing those sounds in which the back of the tongue plays against the roof of the mouth, the tip of the tongue and the lips being out of the physiologic pictures. The important English sounds in this group are [k], [g], [ŋ]. However, we should also include here [ᴊ], [ɟ], [ɲ], [ç], [c], [γ], and [x], as well as those varieties of the *r* that are made with the back of the tongue, i.e., [Я], [Ř] and [ʁ].

(4). *The Glottal Sounds.* This group includes only [h] and [ʔ].

(5). *The Glide Sounds.* This group includes the approaching and receding glides centered around the [u], [i], [ɝ], [ʟ] and [ə] positions.

(6). *The Front Vowels.* The front vowels include those relatively open, voiced sounds in which the mouth cavity is used as a unit resonator, the shape and size of which is controlled by modifying the aperture through which the sound is delivered to the outer air. This modification is accomplished by arching the tongue and holding it in various positions with its highest point about opposite the middle of the hard palate, thus forming a transverse weir over which the sound is delivered to the outer air and behind which is formed a single resonating cavity, including as one chamber the cavities of the mouth and pharynx.

The lowest of the front vowels is [a]. In this sound the arch of the tongue is least and the tongue itself is held the lowest in the mouth of any of the series—the rest of the series having been previously described as running through [æ], [ɛ], [e] and [ɪ] to [i], the highest, which involves a very small front opening for the outward delivery of the sound.

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[1] The student should not gain the impression that, since the term *beta* is used to designate this class of sounds, we mean that all the members of this group have been derived from the sound given by ancient Greeks for the letter *beta*. We have chosen the terms *beta*, *delta*, and *gamma* quite arbitrarily merely as a helpful mnemonic device.

(7). *The Back Vowels.* With the back vowels, the tongue is arched in the back so as to make a resonator in front of the line of arching. The anterior opening of this front resonator is between the lips. In general, the higher the arching of the tongue the smaller is the orifice between the lips. [ɒ], the lowest vowel in this series, is made with the tongue almost flat in the mouth and the lips widely open. The series progresses through [ɔ], [o], and [ʊ], to [u], which is the highest of the back vowels and made with the tongue arched nearly to the roof of the mouth and the lips distinctly pursed.

(8). *The Mid Vowels.* For the mid vowels the tongue is arched along a line between the lines for the front and back vowels. The lowest vowel in this group is [ɑ];[2] next comes [ʌ], then [ɜ], and finally the highest, [ɝ].

(9). *The Laterally Emitted Vowels.* This group includes only the vowel [ʟ], which, as we have noted, is subject to variations in its place of production. It is distinguished from all of the other vowels and consonants by the fact that the air stream is emitted laterally on one or both sides, instead of centrally.

3. Dynamic Phonetics

(1). *The Dynamic Approach.* The term *dynamic phonetics* is used here to express the concept underlying the consideration of speech sounds as they actually occur *in situ,* that is to say, in the moving stream of speech. We have endeavored to keep this concept foremost in mind throughout this section on kinesiologic phonetics, but the very process of describing individual speech sounds tends to make us forget that the finished product, like a building, may be quite different from the units with which it is constructed. At this point, therefore, we turn our attention to a consideration of the dynamic pattern of connected speech, beginning by describing a short sample of English speech according to the terminology and the approach used in this section. If complete, such a sample would include an analysis of the movements of the speech mechanism together with the muscles and nerves involved in the production of the sounds.

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[2] In the pronunciation of some people [ɑ] may be the lowest of the back vowel series.

The phrase chosen for illustrative purposes is: *will you come here* [wɪl ju kʌm hɪr]. In terms of the previous discussion, this phrase would be described as follows: The speech mechanism passes from the resting position to approximately that of the vowel [u]. The vocal folds close to the point of phonation and the articulatory mechanism glides to the position of the vowel [ɪ], thus producing the approaching glide [wɪ]. The glide movement continues in a receding glide from the [ɪ] position to that for [ʟ]. There may be a slight pause at this point, but for all practical purposes the glide movement continues to the position of the vowel [i] and passes thence to that of [u], producing the approaching glide [ju]. Following the completion of this movement, the vocal folds open, and the articulatory mechanism assumes the position for the voiceless stop consonant [k] which is produced in both its implosive and explosive phases. As the explosive phase of the [k] is completed, the vocal folds again close to the point of vibration and the articulatory mechanism takes the position of the neutral vowel [ʌ]. This vowel is terminated by the lowering of the soft palate and the assuming by the articulatory mechanism of the position for the continuant nasal [m]. Following the production of [m], the velum is again raised to close off the nasal passages and the articulatory mechanism goes into the position for [ɪ]. Simultaneously the vocal folds open to the whisper position and close again relatively slowly to the point of vibration thus producing a glottal fricative approach to the vowel [ɪ]. The articulatory mechanism glides with continuous voicing to the position for the vowel [ɝ], producing the receding glide [ɪr]. The vocal folds then return to a wide open position and the articulatory mechanism passes without noticeable acoustic effect to the resting position.

Figure 76 shows something of the nature of such a complicated sequence of articulatory events in the pronunciation of the word *bed-tick.*

In the mental tie-up between speech and writing—between sound and letter—much stress naturally falls upon the principle of the individuality of the speech sound. As letters are distinctly individual units, so must be the sounds that the letters represent; and since these letters remain the same in any combination in which they appear, the sounds must be static building blocks out of which spoken words are constructed. Even the student of phonetics is likely to get this impression when he is first shown the phonetic alphabet and told that we have one symbol, and only one, for each speech sound. This principle of the fixed individuality of the phoneme is true in part, but only in part. When one listens to a speaker, and, as he speaks, transcribes in phonetic symbols the sounds that are uttered, one identifies the sounds to be transcribed partly by noting their individuality and inherent fixed qualities and partly by noting their development from phase to phase and the relationship between successive sounds. A phonetic study emphasizing these developments and relationships may be described as dynamic in point of view.

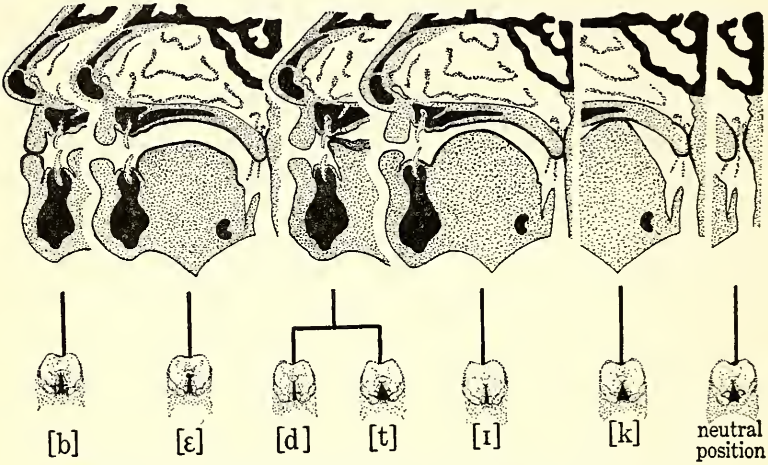

FIGURE 76.—Articulatory adjustments in the word *bed-tick*. See also Figure 79, showing the pressure patterns for these words.

Many forms of human behavior so largely involve movement patterns that if motion be arrested in mid-phase, or even retarded, the significance of the behavior seems modified or lacking entirely. Still photography reveals this importance of movement when it catches and makes static some posture or expression that is but a phase in a series of bodily or facial movements. The bodily posture may seem grotesque and awkward and the countenance may seem to express stupidity or inanity.

Slow-motion pictures, as well as reversed motion pictures, again reveal how much we depend upon movement to give us the significance of any behavior pattern. Motion pictures that are out of synchronization with their sound tracks also give us the effect of distorted facial movements. Even the person who could not adequately describe the series of articulatory movements that should accompany a series of acoustic events in the uttering of a given word or phrase will nevertheless be able to detect immediately a lack of synchronization between picture and sound.

Sculptors, painters, and portrait photographers who endeavor to catch the spirit of the persons whose likenesses they would preserve must avoid postures and expressions that are parts of movement series and catch those that are naturally, even though briefly, static. In walking, for example, there is one phase in which both feet are planted on the ground, at the instant in which the weight is being shifted from one foot to the other. Here the movement is naturally, but momentarily arrested. A still picture of this phase looks "natural." If, on the other hand, the artist should catch the foot on its way to its new position on the ground, the effect would be grotesque.

It is so with speech. Many acoustic events have significance only in their movements or development from sound to sound. In fact there are few speech sounds in which movement does not play a significant part in their phonemic characteristics. These few sounds can be prolonged indefinitely without modifying their character. They would be analogous to the static postures that the artist paints. All other sounds cannot be prolonged, or if prolonged, seem to move out of their phonemes, or may even cease to be speech sounds and become only mechanical noises made by the organs of speech. The English vowels [i], [a], [ɑ], [ɜ], [ɝ], [ɔ], and [u] are prolonged with relatively little perceptual distortion; and [m], [n], [s], [ʃ], in so far as each has special semantic significance when standing alone,[3] can be prolonged without alteration of their perceptual nature. All other sounds must be heard in moving context to seem "natural."

These sounds that involve development by movement may be classed as follows: (1) those vowels whose duration is short; (2) all sounds (both sonants and surds) whose chief characteristics are friction noises, i.e., plosives, affricatives, fricatives, and sibilants, except [ʃ] and [s]; (3) all glide vowels; (4) the nasal [ŋ]; and (5) the aspirate [h].

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[3] [m] and [n] are employed to convey various social attitudes, such as affirmation, denial, surprise, disapproval, etc. [ʃ] is used to signal for quiet, and [s] means warning or disapproval, depending upon the situation.

(2). *The Short Vowels.* If one utters the vowel [ɪ] as in the word *sit* so that the vowel has the duration of [i] as in *seat,* the vowel will, if the quality of the [ɪ] is kept pure through out its utterance, appear to have changed to the [i] phoneme. A part of the [ɪ] characteristic is the shortness of duration of utterance.

Other English vowels whose phonemic values lie partly in the shortness of the time given to their utterance are [ɛ], [æ], [ɒ], [ʌ], [ʊ], and [ʟ]. The shortness of utterance is so prominent a part of the perceptual characteristics of these vowels that if "long" vowels in adjacent phonemes be spoken with short duration, they will seem to change in phoneme. *Seat* spoken with shortened [i] seems to be almost [sɪt]; just as [sɪːt] resembles [sit]. Many errors in foreign dialects of English are due to this perceptual confusion of vowel quality with vowel length.

In order to produce the effect of shortness of duration the vowel must be cut off sharply. This is accomplished in English by the succeeding consonant. Thus it happens that none of the "short" vowels appear finally in a stressed syllable of an English word; and, obversely "long" vowels are those that may appear as final, stressed sounds. Thus we have *pea, pa, paw, pooh, purr* [pɜ] [pɝ], and even *par* [pɑ] (or [pa] in Maine and elsewhere in New England). But we do not have such words as [pɪ], [pɛ], [pæ], [pɒ], [pʌ], [pʊ], or [pʟ], since these sounds would lose a significant part of their individuality without succeeding consonants to cut them off short.

To summarize: If one were to arrange the vowels in a diagram on the basis of their overtone structures and the tongue positions required to produce them, the short vowels would lack definite places in the scheme. Their characteristics are partly dependent upon a thing that can be perceived only when these sounds are uttered in syllables. They have "tongue-placement" and overtone structure, but they have more—characteristics of temporal development and relationships to other sounds.

(3). *Friction Sounds.* The mechanical noises used in English speech, made at the lips or in the mouth, are blended so closely with the preceding or succeeding sounds that, when they appear without such sounds they seem merely like meaningless mechanical noises; at least the longer they are prolonged, if they are continuants, or the more times they are repeated in a series, if they are plosives or affricatives, the less they appear as speech sounds and the more as mere mechanical noises. Probably the chief reason why these mechanical sounds made in isolation seem to be speech sounds, is that when so made they are pure—not mixed with, or influenced by, other sounds; and in speech we have come to identify these mechanical sounds by the blends they make with other sounds. This can easily be demonstrated by making a phonographic recording (say on the dictating machine with a mechanical cutting head) of isolated friction sounds like [f], [θ], or [p]. On the playback, they will be either missing completely or so distorted as to be unidentifiable. Put these sounds in syllables, even in nonsense syllables, and their characteristics appear. Why? Because in our person-to-person speech contacts under adverse conditions we are often unable to hear the friction noises, but we identify the missing elements by the transition sounds that appear between the friction sounds and their preceding or succeeding neighbors.

Compare, for example, [ʃ] and [f] followed by [æ]. Between the [ʃ] and the [æ] is a short glide vowel, partly voiced and partly unvoiced; the [æ] following the [f] is more nearly a pure vowel, not introduced by a glide. This change in the vowel is an incident of the change from [ʃ] to [f] and hence becomes perceptually, a part of the difference between the consonants—a part so important that, when we can actually hear no other differences, we still seem to hear them because of our tendency to reconstruct the whole of a "gestalt" from a significant part of it. Thus we hear the words *shad* and *fad* as significantly different even when spoken under conditions that make the [ʃ] and [f] alone impossible to hear. Since the uninitiated is aware of only one essential difference between [ʃ] and [f]—the difference in mechanical noises—he thinks he has heard these noises.

Let us take for another example the difference between the syllables [æv] and [æʒ]. Here the identifying differences are partly the off-glides from the vowels that introduce the consonants, which are ordinarily, at least in context, sufficient to engender the perception of the fricative patterns for these sounds.

We may say, then, that the [ʃ], or any other friction-sound phoneme, includes not only the friction noise appropriate to it, but also the sounds incidental to joining it to other sounds in a syllable. Thus we have as many [ʃ] sounds as we have [ʃ] combinations. The element that binds all members of the phoneme together is the friction noise; but, when one has had experience in listening to this sound in varying combinations, one learns to identify the [ʃ] by its various incidental linking sounds. Conversely, we learn to recognize as defective, sounds that seem quite standard standing alone, but differ in their linkings with other sounds.

As we have already pointed out, the sound [s] may be made in isolation from other sounds, since it has semantic significance even when standing alone. Many s-lisps sound quite regular when so uttered; but when they are made with the tongue or jaws in non-standard positions, the transition or linking sounds are unusual and unexpected, thus rendering the [s] defective in connected speech.

The plosives and affricates also present special kinesiologic phenomena. Let us compare the [k] sounds in the words *keen* and *mock*. They not only differ in place of production in the mouth and in the quality of the aspirated sound that links each with the rest of the word, but also in the portion of the plosive sound that is emphasized. In *mock* the implosion of the sound is the part that is strongly stressed and in *keen* it is the explosion. In fact, in *keen* one usually hears no implosion at all; and it is possible for one to perceive a perfectly convincing *k* in *mock* even though the speaker deliberately masks, subdues, or obscures the sound of the final explosion. We have therefore two *k* sounds that are not only different in fricative elements, but are actual reverses of each other. The *k* in *keen* is an explosive introduction to a vowel sound, while the *k* in *mock* is a sudden termination of a vowel. We have learned to recognize and identify the various linking sounds in these introductions and terminations, so that they give us the clue to the plosive sound, even though acoustically the sounds identified may be radically different.

(4). *The Glide Vowels.* It has been pointed earlier in this text that the phonemic significance of a glide vowel depends more upon the direction of the glide than upon the positions of beginning and ending of the movement. Two vowel glides, one beginning in the position of [a] and proceeding to about the position of [o], and the other beginning in the position of [ɒ] and proceeding to about the position of [u], both fall clearly within the same phoneme, broadly transcribed as [ɑw]. Yet these two glides overlap only slightly in the sections of the vowel gamut that they span. It is clear, therefore, that if the [ɑw] phoneme is to be seen completely, it must be viewed from the kinesiologic point of view, as well as from that of vowel qualities and positions. There is, however, another kinesiologic consideration that must be recognized: the vowel glide must not only proceed in a given direction from one approximate position to another, but it must also be accomplished with considerable speed. If the [ɑw] glide is made slowly, the perceptual experience of the glide will disappear, and the auditor will hear only a series of vowels graduated in quality from [ɑ] to [u]. What we have just said applies equally well to both crescendo and diminuendo glides; [jɑ] and [wɑ] are as much kinesiologic phenomena as are [ɑj] and [ɑw].

(5). *The* [ŋ] *Sounds.* The *m* and *n* sounds may be perceived either as the initial or the final elements in a syllable; the sound [ŋ], however, when uttered initially in a syllable, is usually heard as [n]. This auditory illusion is probably due simply to the fact that no English words employ the [ŋ] in the initial position. The [ŋ] is also (and probably for a similar reason) perceived with difficulty if standing alone or following [ɝ], [r], [ʟ], or [l]. Thus we may say that [ŋ] depends for its perception more than do other nasals upon its place in a series of acoustic events.

(6). *The Aspirate Attack.* The sound [h] is sometimes said to be merely a whispered vowel, there being, therefore, as many *h*'s as there are vowels. These aphorisms are only superficially true. If one whispers the vowel [ɑ] and does not join the sound so uttered to any voiced sound, no *h* is produced. If one whispers [ɑ] and then, holding the vowel steady, merely adds voice to the utterance, the *h* appears; but it is not perceived until the precise moment at which voicing begins. Thus the *h* is merely a perceptual phenomenon depending upon the addition of voice to an unvoiced vowel. Strictly speaking, the unvoiced vowel itself is no more an *h* than is the voiced vowel; the *h* is the momentary phenomenon of transition from the one to the other. If the transition be reversed, however, and the movement progresses from the voiced vowel to the unvoiced, no *h* results, although the transition from the voiced vowel to the unvoiced is as definitely sensible as is the reverse. We perceive an *h* in one case and not in the other, merely because one transition has been employed as a speech sound, while the other has not.

(7). *Reversed Speech.* Some objects that we view, to be rightly understood, must be seen from certain perspectives. Such are printed words. A pencil is as easily recognizable from one point of view as from another, but the word *pencil* must be viewed with the *p* at the left and the *l* at the right. Analogously, most sounds must be heard from a standard "perspective," that is, the acoustic events cannot be reversed without distorting the perception of the sound so reversed. Much can be learned about the kinesiology of speech by playing phonograph recordings backwards. It will be discovered that some sounds are reversible and some are not. All the continuant sibilants and fricatives are reversible without distortion. The vowels are reversible only if intoned as in song. The spoken vowel, if reversed, suffers a distortion of inflection that so markedly alters the effect as to seem to make a change of phoneme. In addition to this reversal of inflection pattern, a final spoken vowel is further modified on being played backward by an apparent *h*-attack. The unvoicing of the final portion of the vowel is not heard as an *h* when spoken normally, but when reproduced in reverse, the *h* is strikingly apparent. Reversal of the glide sounds produces diametric changes of the direction of the glides, the [ɑw] becoming [wɑ], the [ɑj] becoming [jɑ], etc. Thus *now* in reverse seems very like *wan*. Reversal of voiced plosives changes them very little; but reversal of voiceless plosives produces a marked change. In the usual utterance of the surd plosives, a voiceless glide vowel is produced at the moment of explosion. Since this "off-glide" is so definitely a sound incidental to joining the plosive to the succeeding sound or to bringing the articulatory organs to the neutral position after a final plosive, it is usually unnoticed, at least by the uninitiated hearer. But when the plosive is reversed the sound that now precedes the plosive becomes conspicuous.

In summary, we may say that from the point of view of kinesiology a speech sound has two aspects, its production and its perception. Its production consists of a series of physical events in which the energy of an air-stream is converted into sound waves to be propagated into space in a given pattern of pitch, quality, volume, and duration. Its perception consists of the recognition of this physical pattern, and for this recognition only a portion of the physical pattern need be actually sensible; indeed, a large portion of the pattern may be completely wanting.

(8). *Whispered Speech.* Whispering is an interesting phonetic phenomenon. One who does not vocalize in speaking is of course hampered in conveying his meanings, because, first, his speech lacks carrying power, and second the difference between surd and sonant analogues is markedly reduced, since all his sounds are virtually surds.

With respect to the first of these limitations, it should be noted that the reduction of power is in the low-frequency range (see Chapter 14). The high-frequency sounds are not reduced in power; in fact they may actually be increased in power to compensate for low frequency losses. Thus in whispered speech the pattern of energy distribution is greatly modified. The sounds that are most intense in the voiced speech are least intense in whispered speech.

In meeting the second limitation, that of differentiating the surds from the sonants, the whisperer resorts to certain interesting devices. In unvoiced speech the effect of vocalization is produced by a partial closure of the glottis as the air stream is forced through between the vocal lips. The friction of this passage generates a high-frequency noise capable of activating the resonators of the throat and mouth so as to produce the characteristic tones of the vowels. When the cords are widely separated, this generating noise and its attendant vowel effects cease. In voiced speech the effect of an *h* is produced by attacking the vowel while the glottis is closing to the point of phonation; in whispered speech the *h*-effect is produced by attacking the vowel while the glottis is closing from its most open posture to that point of partial closure that produces a maximum of friction noise without actual vibration of the cords. Thus the "whispered" *h* and the "voiced" *h* are basically different; yet we learn to identify each. The difference between surd and sonant plosive analogues is produced by the device of making the surds more *fortis* (see Chapter 15, paragraph 13) than the sonants. Thus a whispered *time* may be made distinguishable from *dime*, or *peat* from *beat*, or *curl* from *girl*.

The surd and sonant analogues among the fricative and sibilant continuants cannot usually be distinguished in whispered speech.

Chapter 12

Narrow Transcription

We have indicated previously that the purpose of narrow transcription is to indicate variants within the phonemes of a language. It aims to set down finer shades of difference than can be represented by the relatively gross phonemic symbols presented at the beginning of this book. Consequently, narrow transcription employs additional symbols along with various modifying signs to indicate these variants. Most of these symbols and many of the modifying signs have been used and explained in presenting the material of this section. The following table of sounds contains all those that have been used in this book, including those presented in the original *Table of Phonetic Symbols*. Those additional symbols that are but refinements of distinction for purposes of close transcription and to aid in a better understanding of the phonetic principles involved are starred; symbols representing foreign sounds are listed separately.

1. TABLE OF PHONETIC SYMBOLS USED IN THIS BOOK

English Consonants

	Printed Symbol	*Script Symbol*	*Key Word*	*Transcription*
1.	[p]	[p]	pay	[pej]
2.	[b]	[b]	bay	[bej]
3.	[m]	[m]	may	[mej]
4.	[t]	[t]	tip	[tɪp]
5.	[d][1]	[d]	dip	[dɪp]
6.	[n]	[n]	nip	[nɪp]

---

[1] The symbol [đ] is sometimes used to represent an affricate [d̪ð̪] combination. It is one of the supplementary I.P.A. symbols.

	Printed Symbol	*Script Symbol*	*Key Word*	*Transcription*
7.	[c]*	[c]	key	[ci]
8.	[ɟ]*	[ɟ]	geese	[ɟis]
9.	[ɲ]*[2]	[ɲ]	sing	[sɪɲ]
10.	[k]	[k]	call	[kɔl]
11.	[g]	[g]	gone	[gɒn]
12.	[ŋ]	[ŋ]	lung	[lʌŋ]
13.	[f]	[f]	fat	[fæt]
14.	[v]	[v]	vat	[væt]
15.	[ɱ]*	[ɱ]	caveman	[kejvɱæn]
16.	[θ]	[θ]	thin	[θɪn]
17.	[ð]	[ð]	then	[ðɛn]
18.	[s]	[s]	sue	[su]
19.	[z]	[z]	zoo	[zu]
20.	[ʃ]	[ʃ]	shoe	[ʃu]
21.	[ʒ]	[ʒ]	vision	[viʒən]

Non-English Consonants[3]

	Printed Symbol	*Script Symbol*	*Key Word*	*Transcription*	*Description*
1.	[ɸ]	[ɸ]	Pfennig (German)	[ɸɛnɪç]	voiceless bilabial fricative
2.	[β]	[β]	Havana (Spanish)	[aβanɐ]	voiced bilabial fricative
3.	[ç]	[ç]	ich (German)	[ɪç]	German *ich-laut*, voiceless lingua-palatal fricative

---

[2] Also used sometimes to represent an [ɲj] glide.

[3] [F] and [ʋ] are additional symbols used in close transcription to represent lax *f* and lax *v*, respectively.

	Printed Symbol	*Script Symbol*	*Key Word*	*Transcription*	*Description*
4.	[ᴊ]	[ᴊ]	fille (French)	[fiᴊ]	voiced lingua-palatal fricative
5.	[x]	[x]	ach (German)	[ɑx]	German *ach-laut*, voiceless lingua-velar fricative
6.	[γ]	[γ]	rogar (Spanish)	[řoγɑř]	voiced lingua-velar fricative

English Vowels

	Printed Symbol	*Script Symbol*	*Key Word*	*Transcription*
1.	[i]	[i]	eat	[it]
2.	[ɪ]	[ɪ]	it	[ɪt]
3.	[e][4]	[e]	vacation	[vẹkejʃən]
4.	[ɛ]	[ɛ]	pen	[pɛn]
5.	[æ]	[æ]	man	[mæn]
6.	[a]	[a]	ask	[ask] as often pronounced in America. Between [æ] and [ɑ]
7.	[ɑ]	[ɑ]	father	[fɑðɝ̣]
8.	[ɒ]	[ɒ]	sorry	[sɒrɪ̣] as commonly pronounced in England and frequently in America. Between [ɑ] and [ɔ]
9.	[ɔ]	[ɔ]	all	[ɔl]
10.	[o][4]	[o]	notation	[nọtejʃṇ]
11.	[ɵ]*	[ɵ]	stone	[stɵn] New England short *o*

---

[4] In American English, this sound is a vowel glide in accented syllables. In unaccented syllables, it may be pronounced as a relatively pure vowel.

	Printed Symbol	*Script Symbol*	*Key Word*	*Transcription*
12.	[ʊ]	[ʊ]	pull	[pʊl]
13.	[u]	[u]	pool	[pul]
14.	[ʌ]	[ʌ]	sun	[sʌn]
15.	[ə]	[ə]	sofa	[sowfə] used only in unstressed syllables
16.	[ɜ]	[ɜ]	bird	[bɜd] as pronounced in Southern England and parts of Eastern and Southern America
17.	[ɝ]	[ɝ]	better bird	[bɛtɝ̩] [bɝd] as pronounced in the general American dialect
18.	[ʟ][5]	[ʟ]	little	[lɪtʟ̩] vowelized clear *l*
19.	[ᴌ]*	[ᴌ]	buckle	[bʌkᴌ̩] vowelized dark *l*

Non-English Vowels[6]

	Printed Symbol	*Script Symbol*	*Key Word*	*Transcription*	*Description*
1.	[y]	[y]	pur (French)	[pyr]	rounded [i]
2.	[ʏ]	[ʏ]	grün (German)	[gʁʏn]	rounded [ɪ]
3.	[ø]	[ø]	œufs (French) Goethe (German)	[ø] [gøtə]	rounded [e]

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[5] This symbol is used in broad transcription to represent all varieties of the vowel *l*.

[6] Additional vowel symbols: [ɯ] a spread [u], [ʊ̲] a spread [ʊ], [ɤ] a spread [o], [ɨ] a centralized [i], [ʉ] a centralized [u] and [ɐ] a lightly stressed [a]. With the exception of [ɐ], the sounds represented by these symbols do not occur regularly in any of the languages derived from Latin.

	Printed Symbol	*Script Symbol*	*Key Word*	*Transcription*	*Description*
4.	[œ]	[œ]	seul (French)	[sœl]	rounded [ɛ]
			können (German)	[kœnən]	

Members of the *r* Phoneme[7]

	Printed Symbol	*Script Symbol*	*Key Word*	*Transcription*	*Description*
1.	[ɜ]	[ɜ]	early	[ɜlɪ̣]	a high central vowel
			better (general American)	[bɛtɜ̣]	
2.	[r]	[r]	bar	[bɑr]	glides to or from the [ɜ] position
			rob	[rɑb]	
3.	[ř]*	[ř]	hard (Scotch)	[hɑřd]	rolled or trilled *r*
4.	[ɾ]*	[ɾ]	very (British)	[vɛɾɪ̣]	semi-rolled or one tap *r*
5.	[ɹ]*	[ɹ]	try	[tɹɑj]	tongue tip fricative *r*
6.	[ᴙ]*	[ᴙ]	grape (one of the possible pronunciations)	[gᴙejp]	back tongue *r*
7.	[Ř]*[8]	[Ř]	Rote (German)	[Řotə]	uvular rolled *r*
8.	[ʁ]*[8]	[ʁ]	Rath (German)	[ʁɑt]	velar or uvular fricative *r*

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[7] Some phoneticians list also a bi-labial trilled *r*. It is not an I.P.A. symbol.

[8] [R] is a one tap trill. The I.P.A. also gives [χ] as a voiceless form of [ʁ]. All of these *r*'s might be used interchangeably in the illustrative words.

Methods of Initiating or Terminating Certain Speech Sounds

	Printed Symbol	*Script Symbol*	*Key Word*	*Transcription*	*Description*
1.	[h]	[h]	hat	[hæt]	glottal fricative approach or termination, articulatory mechanism stationary
2.	[ħ]*[9]	[ħ]	tea what huge	[t^{ħ}i] [ħwɑt] [ħjudʒ]	glottal fricative approach or termination, articulatory mechanism in movement
3.	[ʔ]	[ʔ]	up, but (as sometimes heard)	[ʔʌp] [bʌʔ]	glottal explosive approach or glottal implosive termination
4.	[t͡ʃ][10] [d͡ʒ] [s͡t] [z͡d] *etc.*	[t͡ʃ] [d͡ʒ] [s͡t] [z͡d]	church judge stance razed	[t͡ʃɝt͡ʃ] [d͡ʒʌd͡ʒ] [s͡tænt͡s] [rejz͡d]	oral explosive approach or oral implosive termination

Symbols Indicating Glides to or from Certain Vowel Positions

	Printed Symbol	*Script Symbol*	*Key Word*	*Transcription*	*Description*
1.	[w][11]	[w]	one how	[wʌn] [hɑw]	to or from approximately the position of the vowel [u]

---

[9] The I.P.A. lists [h] as a voiceless laryngeal fricative and [ɦ] as a voiced laryngeal fricative. The symbol [ħ] is used in the I.P.A. to represent a "pharyngeal fricative," the voiced equivalent of which is [ʕ].

[10] The ligature is not used in broad transcription.

[11] The symbol [ɥ] is sometimes used to represent a close [w].

	Printed Symbol	*Script Symbol*	*Key Word*	*Transcription*	*Description*
2.	[j]	[j]	yes day	[jɛs] [dej]	to or from approximately the position of the vowel [i]
3.	[l][12] [ɫ]	[l] [ɫ]	lay, law ill, all	[lej] [ɫɔ] [ɪl] [ɔɫ]	to or from approximately the position of the vowels [ʟ] or [ᴌ]
4.	[r]	[ϒ]	bar rob	[bɑr] [rɑb]	to or from approximately the position of the vowel [ɝ]
5.	[ə]	[ə]	oh boa	[əow][13] [bᵊoə][13]	to or from the position for the schwa vowels [ə].

2. Modifying Signs for Use in Close Transcription[14]

1. ˌ placed beneath [m] and [n] indicates that these sounds, usually considered as consonants, have become syllabic. Examples: *cotton* [kɑtn̩] and *chasm* [kæzm̩]. The I.P.A. uses the same sign under *l* and *r* to indicate syllabification. In this book, we have followed the practice of using the vowel symbols [ʟ̣] and [ɝ̣] in such words as *fatal* [fejtʟ̣] and *better* [bɛtɝ̣].
2. ː placed after a vowel indicates that its sound is long in duration as compared to an unmarked vowel.
3. ˑ placed after a vowel indicates intermediate length. Example: *research* [riˑsɝːtʃ]
4. ⊥ placed after a vowel and slightly above the line indicates a raising of the position for the vowel.
5. ⊤ indicates lowering.
6. ⊣ indicates advancing or fronting.

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[12] Other *l* symbols are [l̡] for a very clear *l* and [ʎ] for the [lj] glide.

[13] In close transcription, as sometimes heard.

[14] This is a partial list based upon that given by the International Phonetic Association. It contains the more commonly used signs.

7. ⊢ indicates retracting.
8. ˈ placed above and to the left of a syllable indicates primary accent.
9. ˌ placed below and to the left of a syllable indicates secondary accent. (Some writers use a heavy mark, thus **ˈ**, after a syllable to show primary accent, and a light mark, thus ˈ, to show secondary accent.)
10. ⁀ placed above two symbols indicates that the sounds represented are not separate and distinct but fused, thus [t͡s], [z͡d].
11. ̪ placed below a symbol indicates that the sound, not ordinarily made so, is made dentally. Example: dental *t* is [t̪].
12. ˳ placed below a symbol indicates the partial or complete unvoicing of a sound that is ordinarily voiced.
13. ˇ placed below a symbol indicates the partial or complete voicing of a sound that is ordinarily unvoiced.
14. ˜ placed over a symbol indicates nasalization of a sound that is ordinarily non-nasal.
15. ʈ retroflexing is indicated by a curl added to the right of the symbol for the sound. Thus a retroflex *t*, *d*, *l*, or *r* is written as [ʈ], [ɖ], [ɭ], or [ɽ].
16. ˇ placed over a symbol indicates a trill.

3. Sample Transcriptions

In order to present some of the problems of narrow transcription, we have summarized below the uses of some of the symbols and modifying signs. Each part presents a different problem. Possible alternate pronunciations are written vertically below the sound in question. The following examples are in no way concerned with the question of right and wrong pronunciation. They are intended to illustrate the representation of different modes of utterance.

(1). Unstressing and Syllabification

"He added that if the chas*m* had been deep*er*, th*e* acc*i*dent would have been fat*al*."

[hi	ædɪd	ðæt	ɪf	ðə	kæzm̩	hæd	bɪn	dipɚ̣	ði
	ɪ̣				əm			ə	ɪ̣
	ə							ər	ə

æksɪdɛnt wʊd hæv bɪn fejtɪ̣]
ɪ̣ ɛ̣ əl
ə ɪ
ɪ̣
ə

(2). Duration

Farm [farm]
[faːm]
[faᵊm]

"I said *go.*" [aj sɛd goː]
Opposite [ɒ·pozɪ̣t]

(3). Raising, Lowering, Fronting, and Retracting

Cat [kæ˕t] lowered toward [a]
[kæ˔t] raised toward [ɛ]
Cop [kɑ⊢p] retracted tongue position
[kɑ⊣p] fronted tongue position

(4). Accent

Dictionary [ˈdɪk ʃən ˌɛrɪ̣]
[ˈdɪk ʃən ərɪ̣]
[ˈdɪk ʃn̩ rɪ̣]

Defect [ˈdi ˈfɛkt]
[dɪ̣ ˈfɛkt]

(5). Oral Plosive Approach or Termination

Church [t͡ʃɝt͡ʃ]
Judge [d͡ʒʌd͡ʒ]

Bus station [bʌs s̑tejʃən]
[bʌsːtejʃən]

(6). Partial Voicing or Unvoicing

Dog [dɔg̥] (dialectal)
Bet [b̥ɛt] (dialectal)

Satisfy [sat̬ɪ̣sfaj]
Betty [bɛt̬ɪ̣]

(7). Nasalization

Man [mæ̃n]

On [ɑ̃n]

(8). Retroflexing

Turn [ʈɜn]

Row [ɽow]

(9). The Use of [c], [ɟ], and [ɲ]

*G*o *g*et the *k*ey to the *c*ar.
[gow ɟɛt ðə ci tʊ̣ ðə kɑr]

Si*ng* a so*ng* of tha*nk*sgivi*ng*.
[sɪɲ ə sɒŋ əv θæɲcsɟɪvɪ̣ɲ]

(10). The Use of [ɱ]

The cave*m*an e*mph*asized his words.
[ðə cejvmæn ɛmpfəsɑjzd hɪz wɜdz]
ɱ ɱf
mpϕ

(11). The Use of [r], [ř], [ɹ], and [ᴙ]

Don't g*r*ipe, t*r*y to be me*rr*y.
[downt gᴙɑjp tɹɑj tʊ̣ bi mɛrɪ̣]
r r ř
ɾ

(12). The Use of [ħ]

*Wh*ere the *hu*ge *h*ouse *t*ops the *h*ill.
[ħwɛr ðə ħjudʒ hɑws t$^{\text{ħ}}$ɒps ðə hɪl]

(13). The Indication of Drawls, Shortened Glides and Accidental Glides

Pool [pul]	Cat [kæt]	Please [pliz]
[pu$^{\text{ə}}$l]	[kæ$^{\text{ə}}$t]	[p$^{\text{ə}}$liz]
[pu$^{\text{wə}}$l]	[kæ$^{\text{ɪjə}}$t]	[pəliz]
[puwəl]	[kæjət]	

SECTION THREE

PHONETIC METAMORPHOLOGY

Chapter 13

Introduction

The individual sounds of speech as described in previous sections of this book are often interchanged one for another. Different times and different climes make for different sounds. Gladstone pronounced the first vowel in *transmit* so as to rhyme with the vowel in the French word *patte*,[1] in London today we hear [ɑ], in Boston [a], and in Chicago [æ]. Some of us pronounce the final sound in *licorice* as [s] and some as [ʃ]. *Since* was once [siθ];[2] and many children today call it [θinθ]. *Sugar* begins with the letter *s*, but it is pronounced [ʃ]; while its German equivalent, *Zucker*, begins with the sound [t͡s], and the French *sucre* starts with [s].

Phonetic metamorphology is naturally of significance in the science of etymology. Words change their forms not by accident but for definite causes. Etymology is that branch of philology concerned with tracing these changes from age to age and from language to language.

The reader should be apprised here of the difference between the study of English words and phrases from the point of view of their phonetic metamorphology and a parallel study of such words and phrases from the point of view of their etymology. The philologist is concerned with the origin and development of the word in all of its aspects: its meanings, its spelling, its grammatical inflections, and its appropriate contexts; he wants to trace it as far back as possible toward its original source. He wishes also to show the influence of related words upon the evolution of the word being studied. He attempts to record as nearly as possible the various spellings that have been employed for the word as it developed from language to language, as well as variant parallel forms, when two or more lines of descent from an original word can be discerned. It is important indeed for the philologist to get an accurate record of the sequences of the various forms in the evolutionary progress of the word.

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[1] H. C. Wyld, *The Best English*, S.P.E. Tract No. XXXIX, Oxford University Press, 1934.

See Webster's *New International Dictionary.*

The phonetician is concerned, however, only with the *sounds* that have been employed in the utterance of a given word. Since we have no accurate record of these sounds we must rely heavily upon spelling to indicate sound changes; and, since the spelling and the sound have so frequently parted company in the evolution of the word, the phonetician, much more than the philologist, must rely upon speculation and inference.

Let us take an example of the study of the evolution of a word from the philological point of view and compare that study with one the phonetician might make. The philologist notes the Latin word *charta,* a leaf of paper. He notes that the word began to evolve in meaning until it signified not so much the physical thing as the thing drawn or written upon the paper or even an idea or principle exemplified by the writing on the paper, as the *Magna Charta.* He notes that in French the word has two forms *carte* and *charte*, the former having a meaning more nearly like that of the original Latin, and the latter showing a specialized evolution of meaning along two lines, one signifying a document written upon the paper and the other signifying a drawing upon the paper. In English *carte* becomes *card;* while *charte* becomes *chart,* and practically loses one of its meanings in passing from one language to the other. The philologist notes also related words, such as *charter,* and *cartographer*, *cartridge*. He notes, again, the changes of endings from language to language. He studies the modern influence of the surviving parent form upon the meaning and spelling of the modern forms. These and many other studies of the ancestry of these words are the business of the philologist.

The phonetician, on the other hand, notes that for the initial sound of the modern words *card* and *chart* we have definitely different sounds [k] and [tʃ]. For the ending sounds we have [d] and [t]. He notes that in the related words *charta*, *cartographer*, *cartridge*, [k] is used as a beginning sound in modern pronunciations, and that in charter [tʃ] is employed. It seems safe to assume that at some time in the history of these words *ch* was pronounced in two ways, as a back consonant and as a front one. In every one of the related words except *card*, the sound following the *r* is [t]. The phonetician infers from this that the original sound represented by the *t* in *charta* was probably an unvoiced consonant. He guesses further that in changing from *carte* to *card*, a significant number of persons sounded the second consonant with a sufficiently unaspirated (see page 247) effect to suggest a voiced consonant. These inferences are the business of the phonetician. He is concerned with those pronunciations about which he has some reason to be confident. Hence he must overlook in his observations most of the ancient forms whose pronunciations can never be surely known and center his attention upon those forms of whose pronunciation he is sure—usually the modern forms only. Thus he may overlook changes of meaning, changes of spelling, changes of grammatical inflection, and changes of context, except insofar as these changes must be kept in mind in identifying a word, and he must center his attention upon those few members of the evolutionary series whose pronunciation is known. It usually happens in this study that he cannot trace the pronunciation of a word through this evolutionary cycle. *All he can do is to take the few pronunciations that are known* and compare them, whether or not the forms studied are descendents of one another, or are descended from another form about whose pronunciation we can only hazard a guess. The changes with which we are concerned in this study of phonetic metamorphology are therefore only *changes of sound*.

Many fundamental changes in words are traceable to changes in the oral forms of the words, or, in the last analysis, to changes in the neuromuscular patterns of utterance. If the human machine were of steel and glass, we should probably not have a hundred or so English dialects, but one. The human machine, however, is not made of steel and glass, but of protoplasm, a substance capable of great variability of form and adjustability of function. Hence ceaseless changing is the rule. That these changes are by no means random variations is attested by the socalled "etymologic laws"[3] as stated by Verner, Grim, Grassmann, Burgmann, et al.; and that these changes are the result of the simultaneous operation of many causes is attested by the numerous exceptions to the laws. The more powerful the factor that produces a change, the more definitely predictable will be the course of the change, and hence the more nearly universal the law; but the weaker and more conflicting the factors of change, the less predictable the change will be and, hence, the less easily discernible will be the etymologic law that expresses the trend of the change.

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[3] See Webster's *New International Dictionary* for statements of the laws, referred to under the names here listed.

The analysis of these various simultaneously operating causes is the business of phonetic metamorphology. Etymology is concerned with cataloguing and codifying the changes that take place in the genealogies of words; while phonetic morphology is concerned with the study of why these changes take place. In short, the etymologist and the phonetician, as students of words, differ in that one is concerned with stating the laws of change and the other with analyzing the forces that cause the change.

Now these changes from age to age apparently do not evolve any considerable number of new sounds, but make use of sounds once discarded or even of sounds discarded from words in current use. Hence the science of phonetic metamorphology concerns itself quite largely with interchangings among the sounds of speech with which we are already familiar in modern languages.

Certain interesting principles underlie these interchangings. If we group the sounds in families of interchangeables we find three sorts of relationships; (1) acoustic, (2) physiologic, and (3) orthographic, with frequent combinations of these factors.

Certain sounds are traded for each other because they *sound* alike. These acoustic families include such relatives as [f] and [θ]; [r], [w], [l], [j]; and [m], [n] and [ŋ]. Some farmers of the old days used to put the horse between the *fills* and some between the *thills*. The child often speaks of the color *red* as [wɛd], and of the *lady* as a [jejdɪ̣]. *Comptroller* has become *controller* and, in that change, [n] has been substituted for [m] partly because the acoustic effect is similar. The first *n* in *incoherent* is often pronounced [ŋ] for the same reason. It is difficult to produce an [n] before [k], hence some other sound of the same acoustic value is substituted for [n]. Similarly the final sound [ŋ] in *fishing* is often changed to [n] in communities in which *chicken* has become [tʃɪkɪ̣ŋ]. Acoustic similarities are responsible for these interchangings.

In contrast with these acoustic changes we have the physiologic. The Latin *cara*, probably pronounced once with an initial [k], has changed to *cheer*. The slight acoustic similarity between [k] and [t͡ʃ] is probably not responsible for that change. That change took place for physiologic reasons that will be explained later (Chapter 15). The *j* in "jot" was probably pronounced [j] once, but now it is [dʒ]. Physiologic forces made this change in spite of great acoustic dissimilarity.

As examples of orthographic sound changes note the following: Waltham is historically [wɔlthəm], the syllables being separated between the [t] and the [h]; but, because *th* is often pronounced [θ], the word has been changed to amalgamate the two letters into a single digraph with a different pronunciation from that of the two taken separately, i.e. [wɔlθəm]. So we sometimes hear *hartshorn* pronounced [hɑrt͡ʃɔrn] because of a similar amalgamation of the *s* and the *h*. It is obvious that *s* and *h* separately have no kinship with the digraph *sh*. Here a spelling pronunciation is responsible for the change of sound.

Again: The *e* in *sure* is silent, and is of the nature of a diacritical sign to indicate the pronunciation of the vowel preceding. But make a noun out of that adjective by adding *ty*, *surety*, and you will hear that word frequently so pronounced as to give a vowel value to the silent *e*, thus making a third syllable in the word. These orthographic changes are quite inconsistent. We insist on changing the pronunciation of *Derby* [dɑbɪ̣] to [dɝbɪ̣], but are quite content to pronounce *sergeant* [sɑrdʒənt] in spite of its spelling.

These sound changes—acoustic, physiologic, and orthographic—are seen in various situations: in the diction of those defective in speech, in the dialects of a given language, in the changes from the passage of a word from one language to another, and in changes of words from generation to generation in the same language. Let us illustrate: The person with a sluggish tongue-tip, due to paralysis or other cause, is likely to substitute *v* [v] for *th* [ð], as in the word *mother*, making it [mʌvɚ̣]. For him there is but one phoneme for [v] and [ð] as in *with* [wɪv]. In a popular representation of Negro speech the English words *seven*, *eleven*, and *river* appear as [sɛbm̩], [ɪ̣lɛbm̩], and [rɪbə]. We note that *Carolus* of Latin, pronounced probably with a [k], has become *Charles* pronounced with [t͡ʃ], in spite of the fact that the [k] has been preserved in *Carl*, *Carroll*, and *Caroline*. In our own language words have changed their sounds: *clathan* has become *clad*; *thider*, *thither*; and *gwlanen*, *flannel*. Some of these changes are for acoustic, some for physiologic, and some for orthographic reasons, and some for a combination of these reasons. In this book two sorts of reasons will be analyzed, acoustic and physiologic. It should not be adduced that we discount the importance of the orthographic influences. We omit them as being outside the scope of a work on phonetics.

Chapter 14

Acoustic Changes

Three aspects of speech sounds need to be taken into consideration in trying to understand why we tend to hear one sound for another and hence make a corresponding substitution in our language. These are (1) pitch, (2) force, and (3) pressure patterns. Sounds made up of similar pressure patterns are easily confused if their pitch and force are not too dissimilar; and sounds of about the same force will be confused with each other if the other two components are not strikingly different.

1. PITCH

Three general pitch ranges are of significance in the understanding of what one says: the low frequencies, or fundamental tones; the middle frequencies, or resonance tones; the high frequencies, or friction sounds.

The low frequencies are those of the fundamental pitch of the laryngeal stream of tone, ranging from about 100 vibrations per second, in the voices of adult males, to nearly 500 in the treble of women and children. The middle frequencies begin at about 400 (slightly overlapping the low frequencies) and extend to well above 2400 vibrations per second. The high frequencies begin at this point and extend to somewhere between seven and eight thousand vibrations per second.

A distinction should be made between the high frequencies that are upper harmonics of vowels and those that are generated as independent vibratory series. Many vowels have as component elements frequency series that in rate are as high as the "noise" components of some of the consonants. The harmonic frequencies differ from the "noise" frequencies in two ways: First, the harmonic frequencies are dependent upon, and set in motion by, a fundamental tone; while the "noise" frequencies are of independent origin and may or may not be the accompaniment of fundamental tones. Second, the harmonic frequencies are musical, i.e., the vibrations occur in relatively uniform series, one vibration being of about the same length and intensity as the one before it; while in the "noise" series, though all the vibrations are short, those of varying lengths may indiscriminately follow each other.

Low frequency sounds may be confused with other low frequency sounds, middle with other middle frequency, and high with other high frequency sounds. The following lists of sounds are arranged according to frequencies involved:

High frequency only: [p], [f], [θ], [s], [ʃ], [t], [k], [ʔ].

Middle frequency only: none.

Low frequency only: none.

High and middle frequency combined: [h].

High and low frequency combined: [b], [v], [ð], [z], [ʒ], [d], [g].

Middle and low frequency combined: all vowels and glides and [m], [n], [ŋ].

2. Force

Sounds are of varying degrees of sonority. [ɑ] as usually spoken is hundreds of times as loud as [θ], as usually spoken. Some sounds begin softly and increase in loudness, and some sounds begin loudly and decrease in intensity—compare *or* [ɔr] and *raw* [rɔ]. Hence, we may say that we are concerned not only with varying degrees of loudness, but with patterns of changes in force. Sounds of different intensities will not be confused with one another, nor will sounds of dissimilar patterns of force; but sounds having similar sonority and similar patterns of change in force may often be substituted one for another.

Sounds that are relatively soft: [θ], [s], [f], [ʃ], [t], [k], [p], [h], [ʔ].

Sounds that are relatively loud: [ɑ], [ɔ], [ow], [z], [ʒ], [b].

Sounds that increase in sonority: *r*, *l*, *w*, and [j] crescendo (approaching) glides.

Sounds that decrease in sonority: all diminuendo (receding) glides.

3. PRESSURE PATTERNS

When the air stream is stopped by the action of the organs of articulation, pressure behind the place of stoppage tends to rise, and pressure directly in front of the mouth tends momentarily to drop. Both of these changes of pressure are discernible by the speaker through the mediation of the sense of feeling. The inner surfaces of the pharynx and mouth report changes of pressure behind the place of stoppage, and the ears report the changes of pressure outside of the mouth. When the organs stopping the air stream suddenly release it, the pressure outside of the mouth momentarily rises and the pressure in the pharynx falls. These changes are sensed by the speaker; they are transmitted a short distance into space, and may be felt by persons close to the speaker. They are carried by the air as waves, but they are something quite apart from the vibrations of sound, and they move more slowly than sound.

There are four main families of pressure patterns in speech: (1) the plosives, (including affricates), (2) the fricatives (including aspirates and sibilants), (3) the closing sounds, (4) the opening sounds. Sounds having similar patterns of pressure tend to be substituted one for another.

The plosives are: [ʔ], [b], [p], [d], [t], [g], [k], and all of the various oral plosive approaches, such as [p͡f], [t͡s], [t͡ʃ], [d͡ʒ], [d͡z], [t͡θ], etc.

The fricatives are: [ħ], [v], [f], [s], [ʃ], [θ], [z], [ʒ], [ð], etc.

The opening sounds (those begun with the organs of articulation so disposed that there is relatively small passage to the outer air but increasing in size as the sound is uttered): glides from the positions from which [w], [r], [l], and [j] are initiated.

Closing sounds (those sounds begun with the organs of articulation so disposed as to afford a relatively large passage to the outer air, but decreasing in size as the sound proceeds): all diminuendo glides.

4. Illustrations

a. Changes of Sound Probably Influenced Partly by Similarities of Pitch

High Frequency	*s*ecurus	*s*ure
	*s*ucre	*s*ugar
	bra*cch*ium	bra*ce*
	relai*s*	reli*sh*
	porru*s*	porri*dge*
	tré*s*or	trea*s*ure
Middle Frequency	sw*a*pan	sw*oop*
	sk*u*le	sc*ow*l
	sn*u*rten	sn*o*rt
	cunn*an*	cunn*ing*
	he*au*me	he*l*m
	p*u*lten	p*e*lt

A word of caution should be given here about the use of the parallel lists of words in this section of the text. Each pair of words has its own reason for being. In some instances the purpose is to show a change of sound as recorded by two words in a direct lineal descent. For example, the Latin *securus* was in all probability begun with a sound very like [s]—at least it came down to us in that form in most derivatives of *securus*. But in *sure* the beginning sound changed to [ʃ], in spite of the fact that it is still spelled with an *s*. Why, if a sound change did take place, was [ʃ] chosen rather than one of the 40 or so other sounds of speech? Many causes may have operated here; but probably the chief reason why that particular sound was chosen was its acoustic similarity to [s].

In some instances the words in the lists are paired on the basis of their descent from a common ancestor, showing how the peoples of two different communities took the same parent word and substituted different sounds for a given sound in the original word. In one list *thou* and German *du* appear as parallels. The reader is not to assume that one is the derivative from the other. They are given to show the relationship between the sound [ð] and the sound [d]. This they accomplish just as well as cousins as they would as mother and daughter.

In other instances the pairs are not related at all in logical descent, but, having related meanings and somewhat similar pronunciations, they have influenced each other in phonetic form. Such influences exerted between words accidentally associated with each other may be present even when the pronunciations are acoustically different but physiologically similar, or physiologically different but acoustically similar. For example, the two Latin words *poplicus* (of the people), and *publicus* (of adults) ran parallel courses and so profoundly influenced each other that *poplicus* eventually became spelled *poblicus* and finally *publicus*, and *public*, even though the meaning is clearly *of the people*, not *of adults*. Had the Latin word for *of adults* been quite dissimilar from the word for *of the people*, we should doubtless today talk about the "poplic policy," not the "public policy," for we still have the similar forms of *popular*, *people*, and *populate*, and the English "public-house" would not be a "pub" but a "pop" or perhaps a "peop."

In some of the lists, pairs of words are given which have no semantic connection whatever, in order to illustrate influences that cause phonetic changes in spite of other influences that might tend to prevent sound changes. Take for example *mature* and *nature*. In one the "t" is pronounced [t] and in the other [t͡ʃ], the result probably of the influence of a difference in stress.

We should like to emphasize that these lists of words are not designed to show linguistic relationships, but rather to illustrate sound changes and the probable phonetic principles operating to cause such changes. Inferences concerning the derivations and relationships of words must not be made simply because they appear in parallel columns. If such relationships are not already known to the student, he must consult some recognized authority in the field of linguistics. If this is done, it will be found that in each case there exists some relationship that warrants the use of these words as illustrations of sound changes. In fine the reader is cautioned not to force the parallelism between pairs of illustrative words farther than is intended by the authors in displaying the principles demonstrated by such illustrations.

Another word of caution must be offered about the pronunciation of words from which our modern words are derived. Suppose some scholar a thousand years hence should try to reconstruct the phonetic system of the English of 1940, with no more help than we have available to determine the pronunciation of an inhabitant of the London of 940. It would be amusing indeed to wake up in 2940, and hear the professor read to his class passages from Eugene O'Neill in the original.

Inferences as to ancient pronunciations of a word must be drawn with caution. There is, however, one method that may be used with some degree of assurance. This is the device of determining the pronunciation of an ancient word by comparing two or more of its surviving descendants. We know, for example, that *major* represents a change in the pronunciation of *j* from a sound like [j] to the sound [d͡ʒ] for we have the word *mayor* in which the *j* appears as a *y* pronounced [j], and we know also that in ancient Roman manuscripts *major* was spelled *maior*, with nothing at all to indicate any affricate quality of sound at the beginning of the second syllable. Similarly we can with assurance offer *chandler* as an example of a change from [k] to [tʃ], for it is derived from the Latin *candere*, from which we have *candle*, *candid*, and *cannel*.

b. Changes in Sound Probably Influenced Partly by Similarities in Force

tal*uh*	tall*ow*	*g*eol	*y*ule
bel*ig*	bell*ow*(s)	mig*tig*	migh*ty*
fela*ghe*	fell*ow*	nim*an*	nim*ble*
*w*arder	*g*uard	*g*uerroyer	*w*arrior
hebb*en*	heav*y*	le*oht*	lig*ht*

It should be noted that "similarities of force" are here listed, not as factors producing a change of word form, but as influences that in part determine the direction of the change. In the case of the evolution of any given word in the list above many influences have doubtless been operating but the influence to which we direct the reader's attention here is the tendency to preserve in each case the sonority pattern of the word. Thus the influence that we are concerned with here is not so much a factor of change as of *perseveration of form* in spite of change. A similar statement might be made about the following list.

c. Changes in Sound Probably Influenced Partly by Similarities in Pressure Patterns

pi*al*tre	pe*w*ter	ra*bia*	rage
perdi*x*	partri*dge*	dio*ta*	du*tch*
lau*b*ia	lo*d*ge	a*dp*arere	a*pp*ear
gru*an*	gru*el*	sche*ts*	sket*ch*

Chapter 15

Physiologic Changes

1. A PHYSIOLOGIC GROUPING OF SPEECH SOUNDS

Sounds may be grouped into classes on the basis of the physiologic processes necessary to produce them. Sounds of similar physiologic production tend to displace each other more readily than do sounds of dissimilar production; that is, sounds that involve the same muscles and nerves are more readily interchanged than sounds that involve disparate neuro-muscular units. Listed below are five of the physiologic groups or classes of sounds:[1]

(1) The beta consonants include the sounds [b], [p], [m], [v], and [f.]

(2) The delta consonants include [d], [t], [n], [s], [ʃ], [ʒ], [θ], [ð,] and [z].

(3) The gamma consonants include [k], [g], and [ŋ].

(4) The centrally delivered vowels, which may be subdivided into three groups as follows:
  a. Front vowels:[2] [a], [æ], [ɛ], [e], [ɪ], and [i].
  b. Back vowels:[2] [ɒ], [ɔ], [o], [ʊ], and [u].
  c. Mid vowels: [ɑ], [ʌ], [ɜ], and [ɝ].

(5) The laterally delivered vowels [ʟ] and [ᴌ].

2. ILLUSTRATIONS

a. Beta Interchangings

Because the labial sounds involve activity of the lips and no activity of the tongue, they are physiologically so similar that they often become confused with each other. The following illustrations are selected from thousands of possible examples of these interchangings. The sounds of the beta group are: [p], [b], [m], [f], [v].

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[1] See page 180 for the complete grouping under this category.

[2] The unstressing of a front or a back vowel tends to bring it into the group of mid vowels.

[v]	[b]	fe*b*rile—fe*vr*e
		se*v*en—se*b*en (Negro)
		ri*v*er—ri*bb*er (Negro)
		Ha*b*ana—Ha*v*ana
[b]	[f]	*b*rother—*f*raternal
[m]	[b]	nu*m*erous—nu*mb*er
		com*b*—[kowm]
[b]	[p]	crum*b*le—crum*p*le
[m]	[p]	so*m*ething [sʌmpθɪŋ]
[p]	[f]	*p*enny—*Pf*ennig (G.)
		*f*ather—*p*aternal

b. Delta Interchangings

Sounds of the delta group: [t], [d], [n], [s], [z], [θ], [ð], [ʃ], [ʒ].

[ð]	[d]	[t]	*th*ou—*d*u (G.)—*t*u (L.)
			houn*d*—Hun*d* [hʊnt] (G.)
			Go*d*—Go*tt* (G.)
			hol*d*—(sometimes pronounced [howlt])
			quar*t*er—qua*d*
			*d*uo (L.)—*t*wo
			soake*d* [sowkt]
			wor*d*—Wor*t* [vort] (G.)
			mo*th*er—ma*t*ernal—Mu*tt*er (G.)
			fa*th*er—pa*t*ernal
[z]	[ʒ]	[d]	a*z*ure [æʒɚ̣]
			plea*s*ure [plɛʒɚ̣]
			ri*s*ible—deri*d*e—deri*s*ion
			divi*s*ion [dəvɪʒn̩]—divi*s*ible—divi*d*e
[d]	[θ]	[t]	*d*rei (G.)—*th*ree—*t*rio
			*d*one—*th*un [t̪un] (G.)

			McCar*th*y—McCar*t*y
			Smi*th*—Schmi*dt*—smi*t*e
			*d*eus (L.)—Zeus (Gr.)
			*th*rill, *d*rill, nos*t*ril
			*T*ag (G.)—*d*ay
			*d*rum—*th*rum
[t]	[z]	[ð]	Schwar*tz* (G.)—swar*t*—swar*th*y
[t]	[s]	[ʃ]	transmi*t*—transmi*ss*al—transmi*ss*ion
			ra*t*e—ra*t*io
			*st*ehen (G.) [steən] or [ʃteən]
			*Sh*ibboleth—*s*ibboleth
			*s*ure [ʃur]
			preven*t*—preven*t*ion
[t]	[z]	[s]	wi*t*—wi*s*e
			Ka*t*ze—ca*t*
			pre*s*ence [pɹɛzn̩t͡s]
[z]	[s]	[θ]	love*s*—love*th*
[s]	[d]	[t͡ʃ]	prehen*s*ile—prehen*d*—prehen*s*ion

c. Gamma Interchangings

Sounds of the gamma group: [k], [g], [ŋ].

[k]	[g]	[ŋ]	fra*ng*o—freg*i*
			frac*t*us—(forms of the Latin verb for *break*)
	[g]	[ŋ]	ga*g*glion (Gr.)—ga*n*glion
			ga*g*graina (Gr.)—gangrene
			fi*n*ger (often heard as [fɪŋɝ̣])
			wri*n*ger (often heard as [rɪŋgɝ̣])
			lo*n*ger (often heard as [lɒŋɝ̣])
			E*n*glish (sometimes pronounced [ɪŋlɪ̣ʃ])
			cla*n*gor (pronounced both [klæŋɝ̣] and [klæŋgɝ̣]
	[g]	[k]	haggle, ha*ck*, ha*ck*le, he*ck*le

d. Interchangings Among Front Vowels

Sounds of this group [ɑ],[3] [a], [æ], [ɛ], [e], [ɪ], [i].

[i] [ɪ] s*ea*t—s*i*t
creek (pronounced both [krik] and [krɪk])
b*ee*n [bin] (Brit.)—b*ee*n [bɪn] (U. S.)

[ɪ] [ej] s*i*t—s*a*te

[ɛ] [æ] s*e*t—s*a*t

[ɑ] [æ] [a] *a*sk [æsk], [ask], [ɑsk]
c*ar*tridge [kɑrtrɪ̣dʒ] or [kɑ:trɪ̣dʒ]
(sometimes also heard as [kætɹɪ̣dʒ] or [katɹɪ̣dʒ]).

e. Interchangings Among Back Vowels

Sounds of this group: [u], [ʊ], [o], [ɔ], [ɒ], [ɑ].

[u] [ʊ] Note the variant pronunciations of the words, r*oo*f, sp*oo*n, s*oo*t, r*oo*t, and r*oo*m, which sometimes use [u] and sometimes [ʊ]

[ɔ] [ow] "n*aw*"—n*o*

[ɒ] [ɔ] n*au*ght (pronounced two ways)

[u] [ɒ] [ɑ] r*oo*d—r*o*d

[u] [ɑw] r*ou*te (pronounced two ways)

[ʊ] [ɒ] [ɑ] f*oo*t—p*o*d

[ɑ] [ɒ] [ɔ] God, pronounced variously [gɑd], [gɒd], [gɔd].
n*o*t, [nɑt] (U. S.), [nɒt] (Brit.)

f. Interchangings Among Mid Vowels

The sounds of this group: [ɑ], [ʌ], [ɜ], [ɝ]

[ʌ] [ɝ] b*u*st—b*ur*st
f*ir*st rate (pronounced [fʌst])
n*u*ts (pronounced [nɝts])

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[3] The vowel [ɑ] really belongs to each of the front, mid, and back series, since it is the vowel toward which all three series converge. If [ɑ] belongs to any of them alone, it is to the mid series.

[ɑ]	[ɝ]	f*ar*ther and f*ur*ther, the variants in the first syllable being [fɑr], [fɑː], [fʌ], [fɜ], and [fɝ]
[ɑ]	[ʌ]	m*u*ch [mʌtʃ], or [mɑtʃ] (as sometimes heard in British speech) w*a*s [wʌz] or [wɑz] (variants heard in the Mid-West)
[ɝ]	[ɜ]	sh*ir*t (pronounced both [ʃɝt] and [ʃɜt]) g*ir*ls (pronounced [gɜlz], [gɝlz], or [gʌlz]) b*ir*d (pronounced [bɝd], [bɜd], and [bʌjd])

3. Horizontal Interchangings Among the Vowels

The interchangings among the vowels that we have already discussed have been along vertical lines, keeping within vowel groups, but making substitutions of one member of the group for another. We have also horizontal interchangings that cut across group lines to substitute a vowel in one group for one in another, the two vowels having approximately analogous positions in their respective groups. A high back-vowel may take the place of a high front-vowel, or a medium front-vowel may take the place of a medium mid-vowel. Note the two words *halloo* [hæ̣lu] and *holler* [hɒlɝ̣]. When one changes from the former to the latter word, be changes both the first and the second vowel. The first vowel in the formal word *halloo* is a relatively low front vowel. The first vowel in the colloquial word *holler* is a relatively low back vowel. While these changes in the first vowel are taking place, the last vowel is changed in the opposite direction from the high back vowel [u] to the high mid vowel [ɝ]. Examples are the following:

	Front	*Mid*	*Back*
Wish	[wɪʃ]		[wʊʃ]
Yolk	[yɛlk]		[jolk]
What		[hwʌt]	[hwɒt]
Just (adv.)	[d͡ʒɛs͡t]	[d͡ʒʌs͡t]	
Such	[sɛt͡ʃ]	[sʌt͡ʃ]	
Was		[wʌz]	[wɒz]
Hello Hollo	[hɛ̣low]	[həlow] or	[hɒ̣low]

Goose			[gus]
Geese	[gis]		
Brother		[brʌðɝ̣]	
Brethren	[brɛðrɪ̣n]		
Mouse			[mɑws]
Mice	[mɑjs]		

4. INTERCHANGINGS BETWEEN LATERALLY AND CENTRALLY DELIVERED VOWELS

Sometimes *l*'s become regular centrally delivered vowels. This is true not only of the pure vowel *l* but also of the glide *l*. On the other hand, centrally delivered vowels often become *l*'s.

As an example of the change from a laterally delivered to a centrally delivered vowel note the word *colonel* in which the second consonant is a definite *r*, in spite of the fact that the word comes down to us from *columna*, *colonna*, *colonnello* to its present form. If one takes the position that perhaps the *l*'s in these words were always pronounced as *r*'s, then we have an example of a change from a centrally delivered consonant to a laterally delivered one in the modern word *column*, from the word *columna*. Another example of an interchanging of this sort is the word *almond*, which usually employs the centrally delivered vowel [ə] in place of the [l]. In this word we can discern in dialectal pronunciations two complete series of variants: [ɑlmənd], [ɑəmənd], [ɑmənd] and [ælmənd], [æəmənd], [æmənd]. This word is evidently now in the state of transition. Other examples: *American* as pronounced by the Cantonese giving the *r* an *l* value; *plum* and *prune*, both from the same word *prunum*; *milk*, as often spoken by children [mɪək]; *bobble*, *bobber*; *spindle*, *spinner*; *stopple*, *stopper*; *temporary*, *temporal*.

5. CHANGES IN THE LATERALLY DELIVERED VOWELS

1. *Beta* *Consonants*	2. *Delta* *Consonants*	3. *Gamma* *Consonants*
Gravel	Handle	Haggle
Ripple	Rattle	Wiggle
Stubble	Hustle	Struggle

Table
Nipple
Hovel
Gabble
Trouble
Raffle
Awful
Baffle
Camel

Dazzle
Bundle
Frazzle
Thistle
Sizzle
Riddle
Straddle
Final
Funnel

Cycle
Buckle
Fickle
Hackle
Tackle
Toggle
Snuggle
Single
Single
as often heard
[sɪŋʟ̣]

Note how the sound that precedes the syllabic *l* influences the quality of the vowel. List 1 contains illustrations of the vowel [ᴌ] approached from the beta position; list 2 shows the approach from the delta position; and list 3 shows the effect of an approach from the gamma position.

Approaches from the beta and gamma positions cause the vowel to be [ᴌ]; but an approach from the delta position causes the vowel to be [ʟ̣]. In pronouncing the words of these lists the student should take care to stress the first syllable only. If both syllables are stressed, there is a decided tendency to use an [əl] glide as the vowel element of the second syllable. The word then illustrates not the laterally delivered vowel, but a glide.

6. Phonetic Migrations

Thus far we have spoken of the substitution of a sound for another in its own group. There are also certain substitutions of the sounds of one group for those of another. These inter-group substitutions or migrations take place for definite physiologic and phonologic reasons and in definite directions. Five such phonetic migrations can be described: (1) the tendency of gamma sounds to become delta; (2) the tendency of less sonorous vowels to become more sonorous; (3) the tendency of either back or front vowels to become mid; (4) the tendency of laterally delivered sounds to interchange with mid vowels; and (5) the tendency toward a palatization of certain crescendo glides.

(1). *Gamma-delta Migrations.* Three important factors operate to bring gamma sounds into the delta group: (1) the greater visibility of delta sounds as they are made; (2) the greater mobility of the front of the tongue as opposed to the back; (3) the larger number of delta sounds, leading the hearer to perceive a rarer gamma sound as one of the more common and familiar delta sounds. Examples of this migration are as follows:

[k] to [g] and [d͡ʒ]	Mandu*c*are (L.)—man*g*er (F.) man*g*er
[k] to [ʃ] and [t͡ʃ]	*c*andelabrum—*c*andella (L.)
	*ch*andelier—*ch*andler
	hec*k*le—ha*tch*el
	*C*arolus—*C*arroll—*Ch*arles
	*Ch*arlie (pronounced sometimes [ʃɑlɪ̣])
	*ch*iropractor—*ch*iropodist
	*c*aballus—*c*avalry—*ch*ivalry
	omnis*c*ientia—omnis*c*ience
[k] to [s]	*k*uklos (Gr.) *c*irculus (L.)—*c*ycle
	glu*k*eros—gly*c*erine
	re*ci*pio (L.)—re*ce*ive
	re*ce*do (L.)—re*ce*de
	s*c*ion—*c*ion
[g] to [d͡ʒ]	*g*ermen (L.)—*g*erm
	*g*entilis (L.)—*g*entle
[ŋ] to [n]	fishi*ng*—fish*in*'
	seei*ng*—see*in*'
	cf. hu*n*ger and plu*n*ger
	cf. lar*yn*x and lar*yn*ges

(2). *Migrations from Less Sonorous to More Sonorous Vowels.* In many languages of the Indo-Germanic group there is a distinct tendency for verbs to employ root vowels that possess a high degree of sonority; and in cases where the present tense of the verb employs a less open sound there is a marked tendency to change the vowel to a more open one in the preterite or perfect participial forms. Thus the more closed vowels, such as [i], [ɛ], and [u], may be displaced in the root of the verb by such sounds as [ʌ], [ɑ], as [æ]. The more closed the mouth-opening the more muffled and subdued the sound becomes, and the more open the mouth, the more sonorous. The change of vowel is referred to as the "ablaut"; and the verbs that are so modified are called strong verbs.

It is thought by many scholars that this inflection of the verb forms is a survival of a pitch change of tense, a system not unthinkable in view of the pitch systems of many modern languages. Thus the "present" form of the verb was spoken at the highest pitch, the "past-continuing" in a lower pitch, and the "past-completed" in the lowest of all. High pitches are more compatible physiologically with vowels made with the tongue held high in the mouth, and low pitches with vowels made with a depressed tongue. If you ask a person to intone as high a note as he can, he will invariably choose either [i] or [u] as the vowel to be sung; and if you ask him to sing a note as low as possible he will shape his mouth for [ɔ] or [ɑ] or [ʌ]. Hence if one tries to make a grammatical discrimination on the basis of pitch he is likely to fall into the habit of altering the vowels as well as the pitch. If this is the explanation of our strong verbs, *sing, sang, sung* is one of the most perfect modern examples of this type of inflection.

It should be remembered that changes in vowel qualities in modern English have erased many of these ancient distinctions and have in some cases apparently reversed the direction of the ablaut. *Come, came, come,* is in modern English a poor example of the ablaut; but it was a much better one, when *come* was spelled with the vowel *u*, and *came* was pronounced with the vowel [ɑ]. It is doubtful if today the ablaut would prevail in English were it not for the analogy of so many strong verbs in English and in other languages that touch ours closely. Examples of ablaut verbs follow:

Verbs in [i]
- Seek—sought—sought
- Steal—stole—stolen
- Read—read—read
- See—saw—seen

Verbs in [ɪ]
- Stick—stuck—stuck
- Swim—swam—swum
- Win—won—won
- Think—thought—thought

Verbs in [ɛ]
- Tread—trod—trodden
- Sell—sold—sold
- Tell—told—told
- Get—got—gotten

Verbs in [ɑj]
- Ride—rode—ridden
- Fight—fought—fought
- Bind—bound—bound
- Shine—shone—shone

Verbs in [u]
- Shoot—shot—shot
- Lose—lost—lost
- Shoe—shod—shod
- Choose—chose—chosen

Verbs in [e][4]
- Bear—bore—born
- Wear—wore—worn
- Swear—swore—sworn
- Tear—tore—torn

Verbs in [ej]
- Say—said—said
- Break—broke—broken
- Take—took—taken
- Awake —awoke —awakened (awoke)

(3). *The Ablaut in Phonetic Reduplications.* A phonetic curiosity is the "tongue twister" or phrase that seems to distort itself in the utterance, such as:

"She sells sea shells on the sea shore."

"Rubber buggy-bumper."

Then we have the famous ones about Peter Piper the Pickle-Picker and Theophilus the Thistle-Sifter. Although these are composed of words which are easy of utterance individually, the combination is difficult. Yet the difficulty is not due to incompatibility of sound elements, but to a neurological phenomenon. Each word is built into a neurogram that is partly self-guiding. Take the word *rubber*, for example: The stimulus that brings about the change in the position of the tongue in passing from [r] to [ʌ] is the auditory effect of the [r] and the sensations produced by holding the tongue in the position for [r]; and, in turn, the stimulus that effects the closure of the lips for the implosion of [b] is the sensory report from the articulation of the sound [ʌ]. Hence, once the word *rubber* is decided upon and "willed," the utterance takes care of itself much as a phonograph record plays itself. Now if two words have similar portions in their patterns, and if the entire phrase is in process of cerebration, the speaker may confuse the two patterns. The patterns for *she sells* and *sea shells* are nearly parallel. The difficulty in keeping the patterns intact in rapid speech is not that they are different but that they are so nearly similar. The similarities throw the mechanism of motor control of the speech apparatus into the wrong patterns, as a rut catches the wheel of an automobile. When a given neuromuscular process repeats itself there is a tendency to carry out the parallelism farther than the original pattern contemplates. Hence the utterance continues along the lines of the wrong neurogram until the speaker is aware of his difficulty. Then, having made the mistake, he retraces his step and attempts to avoid the previous error. He is likely now to carry on into the first neurogram elements borrowed from the second; and thus he gets into the wrong rut at the very start.

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[4] Strictly speaking, these belong with the verbs in [ɛ]. There are no good examples of [e] ablauts, since [e] is usually the long *a;* before the vowel shift long *a* was undoubtedly pronounced [ɑ], and hence could not be ablauted. The words here given, however, are often pronounced dialectally as [er], though they are marked in the dictionary to be pronounced as [ɛr]. (See page 303.)

This phenomenon of "tongue twisting" is probably related to the almost universal tendency of primitive speech to duplicate syllables and syllable combinations. In these reduplications, found in many languages, the vowel elements may change; but the consonants usually remain unchanged. Between the reduplicative elements there may be a syllable that serves as an intervocalic connection but in no way disturbs the symmetry of the word, as in *tête-à-tête*. English examples of this phenomenon of reduplication are seen in the locutions invented, or easily usable, by children:

Mama
Puppy
Daddy
Knick-knack
At all, at all (Irish)
Wishy-washy

Papa
Nightie-night
Ding-dong
Bric-a-brac
Ping-pong
Telltale

Baby
Bye-bye
See-saw
Teeter-totter
Sing-song
Oh, oh

Then, too, words that are not in themselves clearly reduplicative may be pronounced as such in conformity with this tendency. Note *Singsing* from *Sintsink*, "*didie*" from *diaper*, and *crisscross*, from

Christ's cross. Note also how *statistics* is often pronounced as "*stastistics*." The addition of the *s* completed an almost perfect triplication, made symmetrical by the fact that the word begins and ends on the same sound. Thus, as completed, the word becomes [s͡tə-s͡tɪ-s͡tɪks]; and having been once pronounced this way the form tends to persist, for a reduplicative neurogram is more stable than one that involves a change of pattern.

So strong is this tendency of reduplication, that when two words can be united so as to produce something of this effect, they coalesce, even though the combination may be redundant.[5] Note the mountaineer expressions of *sleigh-sled*, *church-house* [t͡ʃɝt͡ʃɑws], *stair-steps*. Note also more universal uses as follows: *wear and tear*, *tattletale*, *more and more* [morn̩mor], *tip-top*, and *pell-mell* (*mell* coming to us from O. F. *mesler*, to mix). Note also our emphatic form using a repetition of *very*, as "It is very, very cold." The influence that preserves these forms is quite probably their "tongue-pleasing" reduplications. Accidental combinations, however, that occur in reading and speaking, in which there are sufficient reduplicative elements to cause confusion of the neurograms, and for which there are no fully developed neurograms of the combinations as units, cause stumbling of the tongue and changing of the sounds that often amazes the speaker and amuses his audience. At a dinner one of the guests had the party in convulsions of laughter trying to explain that a certain "movie" actor was the "biggest priggish Britisher" she had ever seen.

Whenever the two elements of a reduplicative pair have about equal stress, the second element is likely to employ a vowel that bears an ablaut relation to the vowel of the first element; and only when the greater stress falls upon the first element, as in *baby*, does the second element sometimes employ a higher or closer vowel than the first, though frequently, irrespective of the stress, the second element employs the same vowel as the first. Examples of the "ablauting" of these pairs are the following:

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[5] I have noticed in the South a tendency to repeat whole words in accordance with this pattern. Thus the nurse who took care of our youngest was always having "plenty-plenty" to eat, or it was going to be a "cold-cold" night, or the baby was "cross-cross." This type of reduplication is fairly common in negro speech and is thought to be a carry-over into English of an African linguistic habit. C.K.

Tick-tock
Pitter-patter
Rip-rap
Teetotal
Tick-tack
Flim-flam
Wig-wag
Ship-shape

Note the interesting word built in triplicative pattern, with an increasing ablaut series—a word designed to impress the ignorant and primitive: *Ku Klux Klan* [ku-klʌks-klæn]. This triplication is frequently improved by pronouncing the first syllable [klu], in spite of the spelling. Children have another triplicative series, distinctly ablaut in character, by which they choose one to take some definite part in a game, *tit-tat-toe*, *three'n a row*, etc., with the vowels as follows: [ɪ]-[æ]-[ow], [i]-[ʌ]-[ow].

(4). *Migrations of the Vowels to Mid Positions.* Attention has been called (page 83) to the various neutral vowels that serve as substitutes for many vowels when they are in unstressed syllables in actual speech continuity. This migration is not only a horizontal one, from front and back positions toward a mid-vowel position, but it is also a vertical movement of high and low mid-vowels toward a mid-point on a line between the high and low mid-vowel positions.

The following words show how changes of accent cause many sounds to take positions that can best be indicated phonetically by the symbol [ə]. This symbol stands for a rather large and vague phoneme that shades into the phonemes around it by imperceptible degrees. In many parts of the English-speaking world the front vowels of this list would be "neutralized" to a sound made rather close to [ɪ] but still not definitely [ɪ], partaking of the neutral quality of [ə]. In some dialects the high, back vowels may be neutralized to something close to [ɝ] but still shaded by [ə], for example *potato* [pọtejtɝ̣].

The list below shows the pronunciation of the ordinary speaker of the mid-west (U. S.).

	Strong Form	*Neutral Form*
(i)	m*é*ter	thermóm*e*ter
[ɪ]	acqu*í*sitive	acqu*i*sítion
[e]	ab*é*rrent	ab*e*rrátion

[ej]	degr*á*de	degr*a*dátion
[ɛ]	acad*é*mic	acad*e*míciar
[æ]	decl*á*matory	decl*a*mátion
[a]	p*á*ss	tréсp*a*ss
[ɑj]	m*í*grate	imm*i*grátion
[ɑ]	dr*á*ma	dr*a*mátic
[ɒ]	ab*ó*lish (Eastern)	ab*o*lítionist
[ɔ]	inst*á*ll	inst*a*llátion
[ow]	abd*ó*men	ábd*o*men
[u]	lux*ú*rious	lux*u*ry
[ɝ]	adv*é*r*se	ádve*r*sary
[ʌ]	s*ú*m	s*u*mmátion

7. Palatization of Certain Glides

By palatization is meant the addition to a vowel sound of fricative noises generated by the passage of the air through a narrow orifice, one boundary of which is the hard-palate or roof of the mouth. We shall discuss here certain palatizations that take place when a crescendo glide, containing only vowel elements, is modified into a sound that is an unequivocal consonant. *Education* is usually heard [ɛd͡ʒụkejʃən]; though many who are fastidious about their utterance say [ɛdjụkejʃən]. No doubt the second pronunciation is the purer, but it is not necessarily better. The second pronunciation easily "degenerates" into the first; but the first would not be corrupted to the second form. The explosion of the [d], through the relatively narrow orifice afforded by the [j] position produces a friction that is very like [ʒ]. Those who say [ɛdjụkejʃen] obviate this friction by a management of the tongue that directs the air blade between the teeth rather than against the palate and dental rugae.

This management requires rather definite care, and is the mark of "propriety." Consistency, however, would require that they go one step farther and pronounce the word [ɛdjukejtɪən], for the palatization in the last syllable was brought about the same causes as that in the second. But we are *not* consistent. We have both *educable* [ɛdʒụkəbɪ̣] and *educible* [ịdjusəbɪ̣], when we could just as well have [ịdjukəbɪ̣] and [ẹd͡ʒusəbɪ̣].

The following comparisons demonstrate these changes. It will be noticed that in American speech the transition from the crescendo glide to the fricative generally takes place in unaccented syllables.

Ma*t*ure	[tj]	Na*t*ure	[t͡ʃ]
Cre*d*ulity	[dj]	Cre*d*ulous	[d͡ʒ]
Don'*t* you	[tj]	Don'*t* you	[t͡ʃ]
Ra*d*io	[dɪ̣]	Ra*t*io	[ʃ]
Na*t*al	[tɪ̣]	Na*t*ion	[ʃ]
Gra*d*ient	[dɪ̣j]	Pa*t*ient	[ʃ]
*T*une	[tj]	*T*une	[t͡ʃ] (Brit.)
*D*uke	[dj]	*D*uke	[d͡ʒ] (Brit.)
*D*iurnal	[dɑj]	*J*ournal	[d͡ʒ]

We should call attention to the fact that in these alterations what usually happens is that the first element of the glide wholly or nearly disappears and the place is taken by a fricative, either [ʃ] or [ʒ].

Note also the following words whose present pronunciations, using palatal fricatives, have probably been the result of alterations from some other sounds. In each case the change has apparently been at least partly the result of the presence of a crescendo glide.

	Present Pronunciation	*Probable Original Pronunciation*
So*c*ial	[ʃ]	[kɪ]
Na*t*ion	[ʃ]	[tɪ]
An*x*ious	[kʃ]	[ksɪ]
Spe*c*ial	[ʃ]	[kɪ]
Sche*d*ule	[d͡ʒ]	[dj]
A*s*ia	[ʒ] or [ʃ]	[sɪ]
Hemple*gi*a	[d͡ʒ]	[gɪ]
Re*g*ion	[d͡ʒ]	[gɪ]
Apha*sia*	[ʒ]	[sɪ]
Action	[kʃ]	[ktɪ]

Attention should also be called to a long list of words that are spelled in English with a *j* and were undoubtedly originally pronounced with a [j], but are now pronounced [d͡ʒ]. Apparently what happened was that the [j] was pronounced with so much initial force that it became [d͡ʒ] even in combinations in which it was not preceded by a plosive. This change has taken place in practically every instance in which the modern English word is spelled with a *j*.

Hallelujah still preserves the original pronunciation of the *j*, possibly because of the reverence of the religious person for ancient forms; but *jot* in English is [dʒɒt], while it is [jɒt] in German. In cases in which the original [j] pronunciation is preserved it is common to employ the spelling *y* as in *yacht*, or *i* as in *dominion*. *Yoke*, derived from a forerunner of the Latin *jungere*, still preserves the original pronunciation of the *j*, though we have changed the spelling to *y;* but we have derived another word from *jungere* which we spell with a *j* and pronounce [d͡ʒ], viz., *join*.

Similarly the head of a city is called the *mayor*, and the head of a battalion is called a *major*. Words like *jury*, *June*, *Jack*, *reject* and *John*, that have had long histories of pronunciation with the sound [j], have changed to [d͡ʒ]. Compare also *Yiddish* and *Jewish*.

As in the case of *yoke*, some words are stubborn and refuse to change in pronunciation. In that case we change the spelling to *y*. Note the word *young*, evidently descended from the ancestor of the Latin *juvenis*, from which we have derived a direct synonym of young, *juvenile*. But preversely enough we pronounce this derivative with a [d͡ʒ] (though we spell it with a *j*) in spite of its history and its parallelism in meaning with *young*.

8. Sound Changes Resulting from Incompatibilities

Many sound combinations are difficult, and some are impossible, to produce. When one of these combinations tends to bring about a phonetic change, due to the influence of one sound upon the other or upon other sounds in the word or phrase, they are called incompatibles. There are two kinds of incompatibles: A sound is incompatible with another sound when the utterance of the first of the pair leaves the articulatory organs in a position (1) from which they cannot readily move to the position required for the utterance of the second sound, or (2) from which they can move to the position of the second sound only through positions in which still other sounds are produced. When these incompatibles are brought together, in the building up of words and in their modifications because of sound substitutions and migrations, one or the other of them must yield its identity and take on that of a sound more compatible with the sounds with which it is associated, or a third sound must be interposed between them.

The incompatibles are divided into two groups on the basis of the type of adjustment made necessary by their ineptness: (1) Those whose utterance in juxtaposition, though possible, is clumsy and accomplished only with a considerable effort and care; (2) those that cannot be juxtaposed except by inserting between them a third linking sound. (Neither class includes combinations that, merely because of their strangeness to the English-trained speaker, seem to be incompatible, but are really potentially linkable.)

As an example of the first type of incompatibility note the last three sounds in the phrase *three sixths* [sɪksθs]. Because of the clumsiness of this linking, the sounds usually resolve themselves into [sɪks]. As an example of the second type of incompatibility note the word *sums* [sʌmz]. To link [m] with [z] is not difficult, but the linking is impossible without introducing a [b] or an [n] between them. In close transcription the linking would be represented as [sʌm^{n}z] or as [sʌm^{b}z].

The following table of incompatibilities exhibits the reasons for many sound substitutions. Although only definite consonants are included, it is obvious that all vowels are incompatible with each other: to go from one to another without a stoppage of the breath stream or of the stream of tone is to produce, not the two vowels in question, but a glide. [h] being merely a method of attack on a vowel is not really a sound in and of itself. Only the *voiced* consonants have been included in this table, but linkings between the voiceless analogues of these sounds fall into the same categories as the linkings between the voiced sounds. To illustrate: the last two sounds of *bathes* [ðz] are just as difficult to link as the last two sounds in *sixths* [θs], and for the same reason. Again, *Samson* has a linking between the [m] and the [s] that is exactly analogous to that between [m] and [z] in *sums* either [n] or [p] being the linking sound in this case.

A study of this table reveals that [v] and [f] can begin any sound combination. As beginning sounds they have no incompatibles. [ŋ] as an ending sound has at least fourteen incompatibles, counting both voiced and voiceless sounds. This is in spite of the fact that in English [ŋ] is usually a final, never an initial sound, although there are only eight sounds that it cannot precede in combination.

First sound in the pair to be combined

Second sound in the pair

	b	v	m	d	ð	ʒ	z	n	g	ŋ
b	o							x		
v		o								
m			o	x				x		x
d			x	o						x
ð			x		o		x	x		x
ʒ			x		x	o	x	x		x
z			x		x	x	o			x
n	x		x					o	x	x
g			x					x	o	
ŋ	x		x	x	x	x	x	x		o

TABLE OF INCOMPATIBILITIES[6]

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[6] The authors have been careful in constructing this table to include only the most definite incompatibilities; but it should be pointed out that the degree of effort required to produce one of these combinations is no measure of the incompatibility. The combination [ðz] in a phrase as *with zeal* is clumsy to accomplish, perhaps as difficult as any in the whole table; but its influence upon the sounds involved, to cause intrinsic changes in them, is not as great as that of some easier combinations, as for example [ng] in the phrase *in God*, or [nk] in the phrase *in case.* [ðz] *can* be said, if one is careful enough, but [ng] and [nk] absolutely cannot be managed without a linking [ŋ] The combinations [ng] and [nk] may be regarded as distinctly incompatible, though they seem astonishingly easy combinations to utter. In fact it is the very ease of their utterance that renders them sources of phonetic change wherever these combinations are closely knit, as in *Inca*, *ingot*, *inguinal* and *ink.* Gradually the linking [ŋ] becomes more and more pronounced until it completely dominates the [n] and supplants it. Thus *in-caustum* (L.) becomes *ink* [ɪŋk], not [ɪnk].

These linkings between consonants often involve pairs having similar mechanical and acoustic characteristics. When this happens, a definite consonantal glide is formed quite analogous to a glide from one vowel to another. Hence, just as we have such glides as [aj] and [wɔ], so we may have [mn], [nŋ], [mŋ], [ðz], [θs], [ʃs], etc.

Often in the creation of new words or new spellings, or in the migrations of sounds for causes other than incompatibility, incompatibles are brought together, one of the commonest causes of this being the building of new syllable-combinations in the making of compound words or in the addition of prefixed and suffixes. The following is a sample list of sound changes due to phonological incompatibility:

Incompatible Combination	*Resolution of the Incompatibility*
[nk]	i*nc*ompatibility [ɪn$^{\text{ŋ}}$k] or [ɪŋk]
[nk]	i*nc*oherent [ɪŋko-] or [ɪn$^{\text{ŋ}}$ko-]
[nk]	pa*nc*ake [pæŋk-] or [pæn$^{\text{ŋ}}$k-]
[np]	ha*na*per—ha*mp*er
[dk]	han*dk*erchief [hæn$^{\text{ŋ}}$k-] or [hæŋk-]
[md]	cu*m d*uco—co*nd*uct
[bn]	a*bn*egate [æb$^{\text{m}}$nɪ-]
[ŋs]	sin*g*-*s*ong [sɪŋks-] or [siŋ$^{\text{n}}$s-]
[nb]	i*nb*red [ɪn$^{\text{m}}$b-] or i*mb*red
[kn]	*Kn*abe [kŋnɑbɜ̣] (G.)—kn*a*ve [nejv]
[pn]	ri*pe*ness [rɑjp$^{\text{m}}$nɪ̣s]
	*pn*eumonia—a*pn*ea [æ̣p$^{\text{m}}$nɪə]
[gn]	si*gn*al [sig$^{\text{ŋ}}$nəl] sig*n*
[ðz]	clo*thes* [klowz]

9. Sound Changes Due to Economy

In any language innumerable elisions and substitutions take place that may be explained on the basis of a general principle of economy of effort. As a language matures, words are constantly being simplified, then built together into new combinations, and then again worn down by simplification and abbreviation. It is obvious that in this wearing down process many sounds will be dropped. What we wish to call attention to here, however, is not the dropped sounds, but those that are actually changed to other forms in order to simplify pronunciation. Examples of sounds changes of this type follow:

[sg] to [d͡ʒ]	disgestum (L.)—digest
[mp] to [n]	comptroller—controller
[nkθ] to [nθ]	strength—[stɹɛnθ]
[θ] or [t̪] to [t]	thymum (L.)—thyme [tɑjm]
[fθ] to [t]	phthisis [tɪsɪ̣s]
[fθ] to [pθ]	diphtheria (pronounced [dɪpθ])
[ɪ] to [ow]	will not—won't
[æ] to [ej]	am not—ain't
[ŋ] to [m]	something [pronounced [sʌmpṃ])
[mp] to [ŋ]	pumpkin—punkin
[n] to [m]	captain (pronounced [kæpṃ])
[nd] to [mŋ]	stop-and-go (pronounced [stɒpṃᵑgoʊ])

It will be noted in the above examples that often the new form of the sound changed is no easier to utter in and of itself than the old form, but it fits into the word or phrase as a whole so as to make it possible to minimize the effort of pronunciation.

10. PURE VOWELS VERSUS GLIDES

We may say—a bit hyperbolically perhaps, but with considerable truth—that every English vowel may be either pure or gliding. A large group of vowels are usually pure, i.e., made with unchanging resonance during the time of utterance; but none of them can escape being made into glides in some situations. On the other hand, a large group of vowels are usually glides, i.e., made with a resonance that is constantly changing during the utterance of the vowel; but none of this group can escape being made into pure vowels in some situations. Two factors are at work to determine whether a given vowel shall be uttered as a pure vowel or as a glide: the stress on the vowel in question, and the sound that succeeds it. If a vowel is either unstressed or followed by a voiceless sound, or both, it tends to be pure. If it is stressed and followed by a voiced sound, it tends to become a glide. When these factors operate to change a vowel that is usually pure to one that is a definite glide, or to change a vowel that is usually a glide to one that is pure, the hearer is not aware of the specific nature of the change; though if the tendency be carried to unexpected limits, he becomes aware of a difference in "accent." So the southern "drawl" is an accentuation of the glide tendency, and the "clipped" utterance of the Spanish-American is an over accentuation of the pure vowels.

On page 112 certain "standard" English glides are described. In addition to these there are many "accidental" glides—as many as there are combinations of vowels with voiced sounds following. Consider these pronunciations of *casual*, [kæsuəl], [kæʒuəl], and [kæzʊəl]. The [æ] in the first pronunciation is distinctly purer than for the other two. A close transcription of what the speaker is forced to do in the second and third pronunciations would be more nearly [æjʒ] and [æjz]. Of course it is possible for the first pronunciation to be a glide, but it is not so definitely necessary; hence the vowel would tend to be purer than in the other two forms. But to the untrained ear the vowels in these three pronunciations would be the same, nonstandardized glides being perceived by the untrained listener as pure vowels.

Examples of this type of glide are numerous. In the word *cap* the vowel is pure, because it is followed by a voiceless sound; but in *cab* and *cam*, apparently the same vowel becomes definitely diphthongized toward [ə], as [kæəb] and [kæəm], because the tongue position for [b] and [m] is the position for the vowel [ə]. In the word *cap* the voicing stops before the tongue begins to move in the direction of the neutral position; but in *cab* and *can* the voicing is continuous, hence a glide is produced.

Similarly we often hear [fɪləm] for *film*, but never [fɪləθ] for *filth*. *Alarm* has become modified to *alarum* by a similar "diphthongization" of the [r] through the influence of the [m] following it. Other examples follow:

Vowels	*that form glides*	*under the influence of certain voiced sounds*
Pat [æ]	pad, pan [æə][7]	[d] [n]
Calf [a]	calves [aə]	[v]
Asher [æ]	azure [æɪ]	[ʒ]
Bus [ʌ]	buzz [ʌə]	[z]
Loss [ɔ]	laws [ɔə]	[z]
Wreath [i]	wreathe [iɪ̯]	[ð]
Serf [ɝ]	serve [ɝ^{ə}]	[v]
Help [ɛl]	helm [ɛl^{ə}]	[m]
Built [ɪl]	build [ɪəl]	[d]
Welt [ɛl]	weld [ɛəl]	[d]
Harp [ɑr]	harm [ɑr^{ə}]	[m]
Cart [ɑr]	card [ɑrɝ̣]	[d]
Torque [ɒr]	morgue [ɒrɝ̣]	[g]

It should be noted that in the last six examples the vowels with which we start, in the left hand column, are themselves glides; but under the influence of voiced sounds with which they are linked, in the right hand column, they become lengthened. Take the first of the six, *help* and *helm*. When [m] takes the place of [p], a much "darker" *l* is used for a glide to the [m] position. This *l* is much farther from the [ɛ] position than is the *l* employed in *help*. Hence the glide is lengthened—not so much in time as in the acoustic range covered by the glide.

The following are examples of glides that *tend* to become pure vowels when they occur in unstressed syllables.

STRESSED		UNSTRESSED	
Word	*Glide*	*Word*	*Vowel*
F*or*	[ɔr]	f*or* mé	[ɝ̣]
Comp*aré*	[ɛr]	cómp*ar*able	[ɝ̣]

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[7] The transcriptions indicated here for these glides are, of course, very close. They are not to be followed in the general practice of transcription, unless one wishes to call particular attention to the method of transition from a vowel to a following

Rev*eré*	[ɪr]	rév*er*ent	[ɝ̣]
L*í*brary	[ɑj]	l*i*brárian	[ɪ̣] or [ə]
Degr*á*de	[ej]	degr*a*dátion	[ɛ̣] or [ɪ̣] or [ə]
Infl*á*me	[ej]	infl*a*mmátion	[ɪ̣] or [ə]
Res*i*de	[ɑj]	rés*i*dent	[ɪ̣] or [ə]
Comp*ó*se	[ow]	Comp*o*sítion	[ọ] or [ə] or [ʊ̣]
Pr*o*	[ow]	pr*o*téction	[ọ]
Reb*él*	[ɛl]	réb*el*	[ʟ̣]
Júven*il*e	[ɑjl]	júven*il*e	[ʟ̣]

The following examples show what happens to a glide when it is followed by a voiceless sound, even though the glide in question may be stressed. Some of these examples show only a shortening of the glide, others a definite substitution of a pure vowel.

V*a*se	[vejz]	v*a*se	[ves]
Cl*o*se	[klowz]	cl*o*se	[klos]
D*ie*s	[dɑjz]	d*i*ce	[dɑ^{ɪ}s]
R*i*se	[rɑjz]	r*i*se	[rɑ^{ɪ}s]
Sacrif*i*ce	[-ɑjz]	sacrif*i*ce	[-ɑ^{ɪ}s]
"Pa*r*dner"	[pɑr^{ə}dnɝ̣]	pa*r*tner	[pɑrtnɝ̣]
H*o*ld	[howld]	"h*o*lt"	[holt]

This influence of the succeeding consonant upon the vowel, causing it to be relatively pure if the consonant is voiceless, and a glide if the consonant is voiced, may be illustrated by such pairs of words as *post—posed*, *raced—raised*, *rite—ride*, etc. If one utters *post* with the vowel that used for *posed*, the word sounds as though articulated over meticulously; and if one says *posed*, on the other hand, using the vowel he would use in *post*, the word sounds foreign.

11. Phonetic Time Relations

One of the factors producing acoustic changes in our language—a factor partly involved in some of the metamorphoses mentioned above—is

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voiced consonant. Incomplete glides are ordinarily represented phonetically by writing the glide symbol above the line.

that of timing. We can discern four rather independent series of events in the mechanical processes that go on during speech: (1) the bellows-like action of the chest, driving the air column out through the throat; (2) the movements of the larynx in the opening and closing of the glottis; (3) the opening and closing of the velum; (4) the movements of the articulating structure, the tongue, the lips, and the jaw. Some changes of sound involve no change in these several series of events, but only in the phase relationship that exists between and among them. Series two, three, and four are prone to change time relations with each other and with series one; only series one remains a constant factor or point of reference.

An example of this type of change is the two pronunciations of *humble*, [hʌmbḷ] and [ʌmbḷ], the former being the commonly accepted form and the latter heard frequently in the formalized address of clergymen. No change takes place in the mechanical movements of the four series described above, but one of them alters its timing, viz., series two, the series taking place in the larynx. For both *'umble* and *humble*, series one, the expiratory movements of the bellows, series, three, the closing of the nasal port by the velum, and series four, the shaping of the mouth-mold by the tongue and jaw, all start simultaneously. For *humble*, series two, in this instance the closing of the glottis to the point of phonation, does not start until the others are under way; while in *'umble*, the series of events at the glottis, series two, starts simultaneously with the other three. In [ʌmbḷ] the glottis closes to the point of phonatory vibration at the very beginning of the utterance of the word and remains closed until the end; while in [hʌmbḷ], although the larynx goes through precisely the same movements, it starts its movements a fraction of a second later than in the utterance of [ʌmbḷ]. During that fraction of a second the other three series have proceeded exactly as they would have in [ʌmbḷ]. Thus the change of pronunciation is said to be due entirely to a phase change of series two.

It may be that some day *humble* and *'umble* may come to have separate meanings and uses, just as *price* and *prize* have separated themselves one from the other. In the former, *price*, series two, the laryngeal series, is speeded up so that it is completed and the glottis is opened, stopping the vibrations, before the other series have been followed out to the end; but in *prize* series two is retarded so that the glottis is not opened until series one, three, and four have been completed. One acoustic effect has come to mean *the value paid*, and the other, *the value received*, though both were derived from *praetium* (L.).

For an example of a phase change of series three, note the change of the word *handle* from [hændḷ] to [hænḷ], a change that we may hear in many parts of the South. No change takes place in the mechanical movements of the four series described above, but one of the series alters its timing, viz., the velar mechanism. At one point in the series the closing of the velum is normally slightly ahead of the release of the tongue from its delta position, to produce the plosion of [d] in [hændḷ]. In [hænḷ] the closing is delayed until the exact instant at which the tongue releases to produce the [ḷ]. Thus in [hændḷ] the air stream is momentarily arrested by a complete blocking of the mouth and of the nasal port, while in [hænḷ], when one port is closed, the other outlet is simultaneously opened. But if it were possible for us to watch the movements of the velum in the utterances of these two pronunciations of the word *handle*, we would note no difference, the change of timing being so slight, and the two movement series being identical otherwise.

Let us choose now an example of timing in which the sound is altered through a change in the phase relationship of series four, the articulatory series of events, the other three series remaining constant in their timing with respect to each other. Let us take the word *mouse*, derived from an Anglo-Saxon word probably pronounced [mus]. The change of pronunciation in it and many similar diphthongizations is largely due to a change of timing. At the beginning of the word *mouse* the tongue remains in the neutral position [ʌ]; hence, after the [m], instead of being in the position for [u] the tongue is "caught in the act" of moving toward that position. Since the velum and larynx are ready for vowel production and the tongue is in motion, a "diphthong" results. In [mus] the timing is such that the tongue has moved into the [u] position during the utterance of [m] and hence is ready for a pure vowel at the instant when the lips open at the close of [m]. But it should be noted that the movements made by all of the speech organs are about the same for [mus] as for [mɑws]. In the former case the tongue moves to the [u] position at a time when it will produce no noticeable acoustic effect; but in the latter case, the movement of the tongue is delayed until it produces an actual acoustic result. But the movement has changed chiefly in timing, and only slightly in force and direction. The starting point of this glide is moved from [ʌ] to [ɑ] or in the direction of [ɑ] through the influence of [u]. Since [u] is a back vowel, the neutral position, from which the movement starts, tends to approach the back vowel nearest to the mid-vowel [ʌ]. Hence the glide becomes [ɑw], though with many speakers it is definitely nearer to [ʌw]. As has been observed under the discussion of inter-vowel glides, the termination of such a sound is difficult to fix. The [u] in the original *mus* may be slightly altered in the direction of [ʊ]; so that [ɑw] is a more accurate representation of the pronunciation.

What has taken place to change [u] and [ʊ] to [ɑw] or [ʌw] has also changed [i] and [ɪ] to [ɑj] or [ʌj] in a similar manner. Through a delay in timing of the tongue, *bindan* [bɪndən] has become *bind* [bɑjnd], and *fine* [fine] has become *fine* [fɑjn]; while at the same time we still pronounce the nominative form *finis* [fɪnɪ̣s], employing a high front vowel. Similarly the high mid vowel [ɝ] as in *bird*, *first*, and *Jersey*, becomes diphthongized into something that sounds very like [bəɝd], [fəɝst], and [d͡ʒəɝzɪ̣]. Often the [əɝ] diphthong ends at a point that is closer to [i] or to [ɪ] than to [ɝ], and sometimes it starts at a point closer to [ɔ] or [ɑ] than to [ʌ]. These variations are particularly frequent in New York City "cockney" and in many Southern dialects. This accounts for the confusion between words like *early* and *oily*, *verse* and *voice*, *adjourn* and *adjoin*.

As an evidence of the strong tendency of an open vowel to interpose itself between an initial consonant and a succeeding high front, back or mid vowel, because of the tardiness of the tongue to leave a more or less neutral position, the reader should note that the "off-glides" for all the consonants but [c] and [ɟ], are best represented by [ə]. That is, if the consonant is sounded alone and the voice (or breath, if the consonant be a surd) is continued after the consonant is ended, the sound resulting will be a low, mid vowel, in the general phoneme of [ə] or its voiceless equivalent. Thus when any consonant but the two mentioned above is used initially, any delay in articulation of the consonant with the vowel will introduce some sort of an [ə] glide.

Because this type of "diphthongization" is so common in our language, many other words, having had [u] or [i] vowels originally, change to [ɑw] and [ɑj] by a process of orthographic analogy. There is no good physiological reason, for example, why *wound,* the injury, should be pronounced [wɑwnd]. It is true that it was derived from a word using [ʊ] as a vowel, but the [ʊ] in the original word was preceded, as in the modern word, by a [w]. Now, before [ʊ], [w] begins in a position very close to [u]. Hence there was every reason why Anglo-Saxon *wund* should become [wund] or [wʊund], since to produce the glide would be not only to alter the timing of the movements, but to add others as well. Yet by analogy with *mound, pound, bound, found,* etc., it became changed in the speech of many persons to [wɑwnd].

Naturally, this diphthongization takes place in other languages as well as in English; and when borrowings are made at different historical periods, inconsistent English derivatives result. A borrowing from old German, through the Dutch, gave us *boor*, [bur], while a borrowing from the same German word, with a modern pronunciation, gives us *bower*, [bɑwɝ̣]. (*Boor*, strangely enough, has refused to diphthongize and to take on the refinement of a modern pronunciation.)

Words in which the initial vowel was originally [i], [ɝ], or [u] have a tendency to diphthongize because of the proneness of the tongue and jaw to return to neutral positions, after any articulatory adjustment has been completed, and so to remain at rest until another articulatory movement is undertaken. At the beginning of a word the tongue and jaw are in the positions taken for the sound [ʌ] (see "Neutral Position," page 63). If, on beginning such a word as *ut* (A.S.), the tongue and jaw are sluggish in leaving the neutral position and assuming that for [u], the word becomes not [*ut*] but [ʌut], and that becomes [ɑwt]. The orderly and synchronous carrying-out of the other three series of movements forces a glide when the tongue and jaw are slow in starting their series of movements.

To illustrate and summarize this phenomenon of timing let us take a nonsense word [ɑmuθ]. Note the three series of movements that take place in synchronization with the expiratory movements of the abdominal and thoracic muscles.

1. *Laryngeal Series:* The glottis closes at the beginning of the expiration and remains closed until almost the end, but opens before the

air pressure in the trachea falls. Thus the vibrations cease because of the parting of the vocal cords, but not because of the cessation of the expiratory movement of air.

2 and 3. *Velar Series:* The velum opens and closes once.

4. *Articulatory Series:* The mouth is open fairly wide at the beginning of the utterances; it is then closed by the lips; then the lips open slightly and the tongue rises to the high back position; and finally the tip of the tongue is placed between the teeth, and the sides of the tongue block the outlet of the air by tight contact on the sides of the upper dental arch.

Now let us change the timing of the laryngeal series. Let us begin the vibrations after the other three series are well under way. We then have [hɑmuθ]. Or, if we carry the laryngeal series to the end of the other three series, we have [ɑmuð]. No essential change in the laryngeal series has taken place, and yet the sounds have altered.

Next let us change the velar series. If we cause the velum to close a little earlier than in [ɑmuθ] we get [ɑmbuθ], because a pressure is built up, the lips being already closed for the [m]. If we delay the opening of velum until well after the lips have closed, we develop pressure at another point in the series and have not [ɑmuθ] but [ɑbmuθ]. In neither of these changes has the movement of the velum essentially changed, and yet by a change in time relations with other series the sounds are altered.

Again, change the articulatory series by causing the tongue to delay in its upward movement. Since the tongue is not ready to hold a static position when the lips open, the [u] that follows [m] in [ɑmuθ] becomes a glide, or vowel made while the tongue is in motion. (The only other alteration of articulatory movements here is one that is correlated with this delay in the timing of the tongue, viz., the lips open a little farther after [m] than they would if the tongue were already in position for [u].) Thus the word changes from [ɑmuθ] to [ɑmʌwθ], which readily metamorphoses to [ɑmɑwθ]. Hence a decided acoustic change results from a slight delay in a tongue movement, with no actual, essential changes in the articulatory movements themselves.

In the following list of words the chief difference in pronunciation is in the matter of timing.

Change in Timing of the Laryngeal Series (Series 2).

White [ħwɑjt] (U.S.)	[wɑjt] (Brit.)
Coverlet [-lɪt]	coverlid [-lɪd]
Safe [seʲf]	save [sejv]
Grease [gris]	grease [griz]
Rains [rejnzˢ]	[rejnz]
Why [ħwɑj] (question)	why [wɑj] (exclamation)
Human [ħjumən]	[jumən]
Blouse [blɑws]	[blɑwz]
Shea*th*	shea*the*
Loo*se*	lo*se*
Hou*se* (n)	hou*se* (v)

Change in Timing of the Velar Series (Series 3).

Oh, goodness!	[gʊdnɪ̣s]	[gʊnɪ̣s]
Singing	[sɪŋɪ̣ŋ]	[sɪŋgɪ̣ŋk]
Wednesday	[wɛnz͡dɪ̣]	[wɛdn̩z͡dɪ̣]
Singest	[sɪŋɪ̣st]	[sɪŋgɪ̣st]
And	[ændᵊ]	[ænᵊ]
Finger	[fɪŋgɝ̣]	[fɪŋɝ̣]
Brand new	[bɹændnju]	[brænːju]
Drowning	[drɑwnɪ̣ŋ]	[drɑwndɪ̣ŋ]
Annex—derived from *ad nexus* (L.)		
Campbell	[kæmbḷ]	[kæmḷ]
Family	[fæmlɪ̣]	[fæmblɪ̣]

Change in Timing of the Articulatory Series (Series 4).

			Probably pronounced
Our	*from*	ure (A.S.)	[ur]
Out	"	ut (A.S.)	[ut]
Bounce	"	bunsen (M.E.)	[bunsən]
Hound	"	hund (A.S.)	[hʊnd]
Pound (v)	"	punian (A.S.)	[pʊnɪən]
Bower	"	bur (A.S.)	[bur]
Bow (v)	"	bugan (A.S.)	[bugən]

Foul	“	ful (A.S.)	[ful]
Mow (n)	“	muga (A.S.)	[mugə]
Ice	“	is (A.S.)	[is]
Ides	“	idus (L.)	[idəs]
Idle	“	idel (A.S.)	[idəl]
Ire	“	ira (L.)	[irə]
Iris	“	iris (L.)	[irɪs]
Pilot	“	pilote (F.)	[pilotə]
Pike	“	pic (A.S.)	[pik]

Compare the above list with certain words that have preserved their [u] and [ʊ] vowels in spite of their new spellings—again a phenomenon of timing:

			Probably pronounced
Through	*from*	thurh (A.S.)	[θur] (guttural *r*)
You	“	thu (A.S.) cf. *thou*	[ðu]
Could	“	cuthe (A.S.)	[kuðə]
Route	“	rupta (L.)	[ruptə]
Uncouth	“	uncuth (A.S.)	[unkuð]

12. ASPIRATION

A special problem of timing is involved in what is known as *aspirate* and *unaspirate* attacks upon, and releases from, vowels. If the larynx is so managed that whenever the passages through the mouth or nose are open, i.e., when they offer no resistance to the outrushing air-stream, the vocal cords being closed to the point of vibration or closer, we produce *unaspirated* effects; but when the larynx is so managed that there are periods during the utterance of speech when there is an unobstructed passage to the outer air—blocked neither by the vocal folds nor by the articulating organs—then we produce *aspirated* effects.

English, more than many languages, is characterized by these *aspirated* effects, being much more prodigal of the air in the thoracic reservoir than is a more *unaspirate* language, such as Chinese. There are two principal situations in which these effects appear in English:

(1) following voiceless plosives, and (2) preceding voiceless fricatives. (There is also a slight tendency toward aspiration preceding voiceless plosives).

(1). *Aspirated and Unaspirated Plosives.* Note the word *tap*. There is a distinct interval of time between the explosive release of the tongue from its palatal contact in the production of [t] and the instant at which the glottis closes and the vowel sound [æ] begins. During that interval the air rushes out without resistance. Since the tongue is rapidly assuming the posture for the production of [æ], the sound produced during that interval might be described as a voiceless glide to the position for [æ] or as an [ħ]. Now, if one times the movements of the larynx so that the voice begins at the very instant of explosion, i.e., exactly when the tongue is pulled away from the palate, then this *h* attack on the vowel [æ] does not appear, and we produce a so-called unaspirated *t*. If we now time the movements of the larynx so that the glottis closes before the plosion, or during the period of implosion, then we produce not a *t*, but a *d*.

In English there are eight possible combinations of voiced and voiceless sounds introduced, concluded, or connected by plosives. They are here demonstrated by the following descriptive symbols: > represents the period of implosion during which the pressure is building up in the mouth; < represents the period of explosion; the space between, when > < are paired, represents the period of plosion or holding of the impounded air under pressure; *x* represents a voiced sound; *o* represents a voiceless sound. Let us use delta plosives for all eight examples:

1.	Ba*d* *d*ay	x> <x
2.	Ho*t* *t*ime	o> <o
3.	Be*d*-*t*ick	x> <o
4.	Si*t* *d*own	o> <x
5.	*T*ea·	<o
6.	*D*ay	<x
7.	Ca*t*	o>
8.	Ca*d*	x>

Example 1 is not aspirated because at no time does the air stream find a free passage to the outer air. It is checked all of the time at the glottis and part of the time by the tongue as well. Example 2 shows two periods of aspiration—when no resistance is offered to the outrushing air stream—the first being the interval after the cessation of the laryngeal vibrations for the production of the vowel [ɒ] and before the period of complete plosion starts; the second being the interval between the explosion and the beginning of the glide [ɑj]. The aspiration during the second interval is much more prominent than during the first. Example 3 has only one period of aspiration, following the explosion; 4 has only one period of slight aspiration, during the interval between the vowel [ɪ] and the plosion; 5 shows a distinctly aspirate approach to the vowel [i]; 6 has no period of free egress of the air; 7 has only a very brief interval during which the air may rush out unimpeded, and 8 has no such period. (Of course in connected discourse combinations 5, 6, 7 and 8 would often appear as examples of combinations illustrated by 1, 2, 3, and 4; and even when standing alone 7 and 8 are pronounced with off-glides, that with 7 being surd and with 8 sonant). Hence 2 would be the most definitely aspirated, and 1 the most definitely unaspirated. Example 4, though an "accidental," may be described as an unaspirated *t*, because the voicing begins at the moment of explosion, just as is habitual in speech situations in which an unaspirated *t* is standard.

We have in English few unaspirated plosives with voiceless implosions. Those we have may be grouped in these classes:

1. Accidentals, as in *sit down*, *right door*, *cup-board*, *thick gum*, etc., in which a voiceless plosive is linked with a following voiced plosive, so that we have virtually only a single consonant, a composite one with the first half of the voiceless plosive joined to the last half of the voiced plosive.

2. Voiceless plosives initiating unstressed syllables as in *city*, *hopper*, *heckle*, etc. Usually with a reduction of stress the aspiration of a plosive is diminished.

3. Voiceless plosives directly linked with a preceding [s], as in *span*, *stand*, *school*, etc. *Span* is by no means [pæn] plus an initial [s]. The linking of the [s] and a voiceless plosive in English usually renders it unaspirated.

The accidentals, when they occur in stereotyped, unit phrases, do not long remain in our language, their place soon being taken by a single voiced plosive. Note what happened to the shelf upon which cups were set. It was a *cup-board*, perhaps at first [kʌpə̥bord], then [kʌpbʊ̣rd], with one implosion and one explosion for the two consonants, the voice starting during the interval of plosion or at the instant of explosion, thus producing a fairly typical unaspirated *p*. Then because the unaspirated plosive with a voiceless implosion is not a part of the language habits of the English speaker, the sound changes to a completely unaspirated plosive, *b*, and we have today a rhyming of *Hubbard* and *cupboard*.

(2). *Aspirated and Unaspirated Fricatives*. In English the transition from a vowel sound to a surd fricative is usually accomplished by opening the glottis at the instant at which the tongue quits the vowel position and begins to move in the direction of the position it will occupy for the fricative. Thus, in the interval between the cessation of the voiced tone and the beginning of the fricative sound, air is streaming out without resistance. The sound produced in this interval is a sort of a voiceless glide. This will be heard easily if one speaks slowly the word *ash*, [æʃ], being careful to keep the vowel pure. If the timing at the glottis is altered in such a way that the voice continues until the fricative sound starts, we have a typical unaspirated surd fricative, not standard in English, though occurring in many dialects. The effect is that of a glide that almost merges into the fricative consonant, as [æjʃ]. If we continue the voice on into the fricative we have the voiced fricative usual in English, and the word becomes [æjʒ]. *Azure*, therefore, is not the parallel of *Asher*, because our English pronunciation of the latter is too definitely aspirated. If *Asher* were pronounced with an unaspirated approach to the consonant, it would be a fair analogue of *azure*.

The following are examples of aspirated and unaspirated effects. The changes illustrated are brought about by the juxtaposition of surd and sonant plosives, accidentally producing unaspirated surd plosives.

Clapboard	[klæp͡bord] or [klæbɜ̣d]
Sit down	[sɪtdɑwn] becomes [sɪ̣dɑwn]
Blackguard	[blækgɑrd] or [blægɜ̣d]
Background	[bækgrɑwnd]
Make good	[mejk͡gʊd]
Scrapbook	[skræp͡bʊk]
Campbell	[kæmpbɛl] or [kæmbɪ̣]
Soapbox	[sowpbɒks]

The following variations sometimes heard in certain dialects of English illustrate unaspirated fricative effects:

Ask	[æjsk]	Wash	[wɒrʃ]
Flesh	[flɛjʃ]	Mush	[mʌrʃ]
Dish	[dɪjʃ]	Class	[klæjs]

(3). *Illustrative Tracings.* These tracings are from a phonautograph with the mouth-piece held over the mouth of the speaker in such a way as to record the changes in pressure at the lips. Although these tracings show the pressures in the mouth-piece, the corresponding pressures in the mouth or behind the lips or tongue, as the case may be, may be inferred from them. An up-stroke means that the pressure is rising in the mouth-piece and falling in the mouth, and a down-stroke

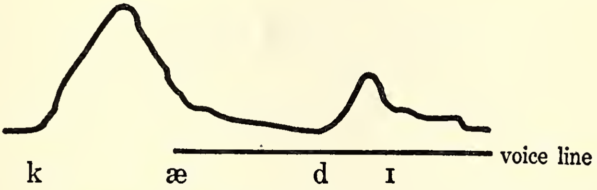

Figure 77.—Pressure pattern of the word *caddy.*

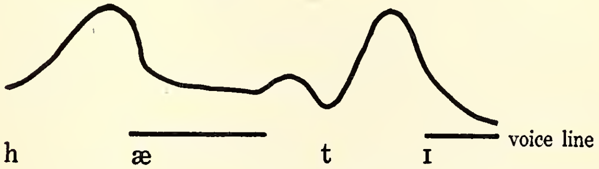

Figure 78.—Pressure pattern of the word *Hattie.*

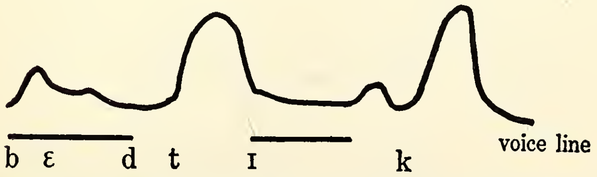

Figure 79.—Pressure pattern of the word *bed-tick.* See also Figure 76, showing the articulatory adjustments for these words.

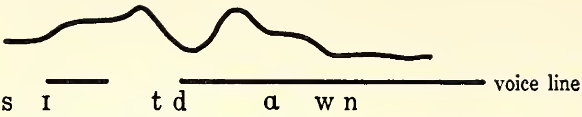

FIGURE 80.—Pressure pattern of the words *sit down.*

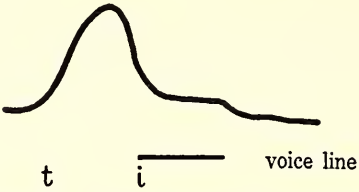

FIGURE 81.—Pressure pattern of the word *tea.*

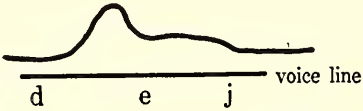

FIGURE 82.—Pressure pattern of the word *day.*

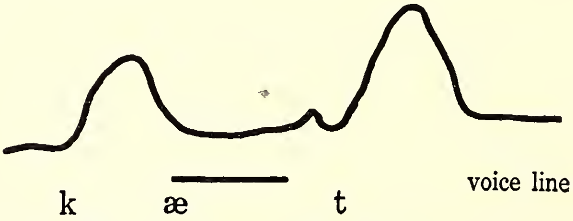

FIGURE 83.—Pressure pattern of the word *cat.*

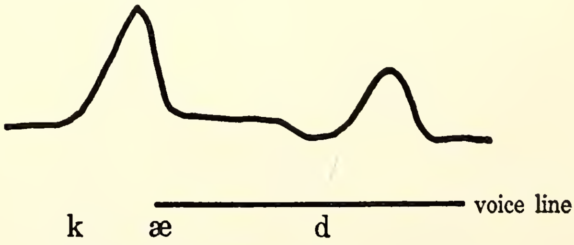

FIGURE 84.—Pressure pattern of the word *cad.*

means that the pressure is falling in the mouth-piece and rising in the mouth. Naturally all plosives, voiced or voiceless, show a rise of pressure in the mouth-piece at the instant of explosion. Then, too, all aspirate effects cause a rise of pressure in the mouth-piece because of the quantity of air that is expelled, there being no check either in the larynx or in the mouth. Note, therefore, that the up-stroke in *Hattie* is more definite than that in *caddy*, and that in *tea* more pronounced than that in *day*. The line below the phonautographic tracing shows the duration of the voicing.

13. FORTIS AND LENIS EFFECTS

Consonants may change their forms in still another way: Those that are *lenis* may become *fortis*, and those that are *fortis* may become *lenis*. These are relative terms, referring to two aspects of the utterance of the consonant: (1) the amount of aspiration, and (2) the degree of breath pressure developed between the glottis and the outer air through the impounding of the air stream by the organs of articulation. The consonant that is made with a considerable release of unvoiced air and/or a vigorous resisting by the articulators of the outrushing air stream is described as *fortis;* one made with little aspiration and/or a lax resistance by the articulators of the air current is *lenis*.

The reader may ask how to describe a consonant made with considerable aspiration and lax articulation, or one with no aspiration and vigorous articulatory resistance. The question is a bit academic, for these combinations are rare, especially in English. The reason these two apparently unrelated aspects are linked as they are is a purely mechanical one. We have as an analogue the damming of a stream for the conversion of power from the increased head of water. If two power dams are placed too close together along a stream, they can both generate power only at high water. At low water the lower mill-pond becomes depleted, the head of pressure drops, and the wheel must be stopped until the pond is filled again from the mill-race of the upper plant. If, however, the upper dam is opened and the water is permitted to flood into the lower pond, the pressure builds up against the dam and the wheel may be run more continuously.

In this analogy the upper plant is the glottal mechanism, and the lower, the organs of articulation. If the air stream is stopped at the glottis and its kinetic energy converted there into sound waves, little energy is left to be converted into sound waves at the next dam, the one in the mouth. If, on the other hand, the air stream is permitted to pass through the glottis without resistance, it has adequate energy, when it reaches the mouth, for conversion into sound waves of considerable intensity. Thus, other things being equal, voiceless plosives are always more fortis than voiced ones. Or, to say it another way, if the air stream is arrested at the larynx, the force of the muscles of expiration plays against the resistance offered by the muscles that adduct the vocal cords and hold them approximated; but if the air stream is arrested at the mouth, the muscles of expiration play directly against those of articulation. It is possible by a vigorous expiratory effort to secure a high-water effect and, with both "conversion plants" functioning, to produce intense sound waves even at the second dam; but, since most speakers economize on their phonatory and articulatory efforts, only one power plant operates at a time to convert the energy of the air stream into sound waves of any considerable intensity. Thus with the laryngeal dam functioning, the oral dam must either produce relatively feeble sound waves, or the dam must be held closed through a longer period of time so that pressure may be built up by the accumulation of air that is permitted to pass through between the vibrating vocal bands.

Let us take an example. The *t* in the word *until* is readily made vigorously, because during the utterance of that sound the glottis is open and the air pressure quickly builds up behind the tongue. Suppose we change the word to *undo*. Now to get any considerable acoustic effect on the *d* we must either drive much more energy through from the expiratory muscles to the tongue, or we must prolong the period of the plosion of the *d* until the pressure accumulates to a point sufficient to make a vigorous explosion when it is released. The English speaker is too "lazy" too adopt the former course. The latter course alters the English speech pattern and gives a very foreign "accent" to the word *undo*. For example, the word *bravado* [brəvɑdo], spoken with a definite hold on the *d* and a consequent build-up of pressure, sounds foreign. Spoken exactly the same, except that not sufficient time is allowed for this build-up of pressure, the word has the accustomed English flavor. This method of producing a fortis effect by prolongation of plosion is used in English only when necessary for the meaning, as in the phrases *cab-boy*, *grab-bag*, *red dress*, *big game*, *with those*, *last door*, etc.

English is notoriously a language having alternate stress, with sharp differences in force between the accented and the unaccented syllables; and since an unaccented syllable is undertaken with less expiratory effort than is a stressed syllable, when a consonant initiates an unstressed syllable that consonant is less vigorously uttered than the same consonant would be at the beginning of a stressed syllable.

Thus we may arrange in order, from the most fortis to the most lenis, a series of typical English sounds, as follows:

1. Aspirated stressed consonants: *t*ime, ligh*t*, relea*s*e, se*c*ure, cat-*t*ail
2. Aspirated unstressed consonants: rea*p*er, bu*ff*er, tac*k*le, ho*p*ing, *p*erhaps, be*d*-*t*ick
3. Unaspirated stressed consonant: be*g*, re*j*ect, s*t*ick, s*p*an, be*d*-*d*own
4. Unaspirated unstressed consonants: s*t*ability, S*p*okane, ru*bb*er, wi*gg*le, fo*dd*er.

Numbers 1 and 4 would undoubtedly be classed respectively as fortis and lenis examples; but 2 and 3 could not be so definitely classified. Thus we say that *fortis* and *lenis* are terms, not of absolute classification, but of descriptive significance when consonants are being compared with one another.

14. CHANGES OF ATTACK AND RELEASE

Listed below are illustrations of modifications of sounds resulting from change of attack upon or release from fricatives. (See pages 172 to 176 for a discussion of the principles involved here):

Change of Attack from Open to Closed and Vice-Versa:

Garage	[garaʒ] or [gərɑʒ] [gərɑd͡ʒ]
Tin*s*el	[tɪnsəl] [tɪnt͡səl]
*Ch*antey	[ʃæntɪ̣] [t͡ʃæntɪ̣]
*Ch*aps	[ʃæps] [t͡ʃæps]
Cen*s*ure	[sɛnʃɝ̣] [sɛntʃɝ̣]
Han*ds*ome	[hæn͡dsṃ] [hænsṃ]
Ma*tt*hew	[mæt͡θjụ] [mæθjụ]

C [t͡sej] (G.) [si] (Eng.)
Heal*th* [hɛlθ] [hɛlt͡θ]
Brea*dth* [brɛd͡θ] [brɛəθ] (sometimes)
A*v*er, from *avertere* (L.) from *ab vertere*
Wal*th*am [wɔlt͡θəm] [wɔlθəm]

Change of Release from Closed to Open and Vice Versa:

Haste—ha*st*en
Ca*st*ellum (L.)—ca*st*le
Pi*st*illum (L.)—pe*st*le
Ne*st*—ne*st*le
Moi*st*—moi*st*en
Li*st*—li*st*en

15. The Phonemic Balance of the Language

Any change resulting from the extension and application of a special trend of pronunciation is likely to cause changes in other sounds than those directly affected by the trend. There is a constant rebalancing of phonemes in any language to counteract the ambiguity of meaning that may result from the overloading of a given phoneme. It is to be expected, for example, that when the "*ar*" words gradually lose their *r* sounds and are pronounced with the pure vowel [ɑ], the phoneme [ɑ] will become heavily loaded with ambiguous combinations. This particular unbalancing of the language is especially likely to take place in parts of the English-speaking world in which the "short *o* words" are pronounced with the [ɑ] sound. In such dialects we not only have the group of words like *father, calm, ah,* etc. and words like *nob, cob, lock, Tom,* but also the very large additional group of words spelled with *ar*. This necessitates the removal of a group of these words to another phoneme, in order to avoid such ambiguities as *balm* vs. *bomb, barb* vs. *Bob, part* vs. *pot, tart* vs. *tot*. Consequently, in the resolution of the ambiguities, the short *o* words may be separated in their pronunciation by being given a vowel quality of a distinctly different phoneme than that of [ɑ]. The one usually employed is [ɒ].

It is interesting to observe also that the [æ] phoneme seems now to be in a state of flux. This flux is evidently a rebalancing of the phonemes [ɑ], [a], [æ] and [ɛ]. Note the following variant pronunciations:

Catch	[kɛt͡ʃ]	[kæt͡ʃ]
Thresh Thrash	[θrɛʃ]	[θræʃ]

Can	[kɛn]	[kæn]
Half	[haf]	[hæf]
Dance	[dans]	[dænt͡s]
Drama	[dramə]	[dræmə]
Almond	[amənd]	[ælmənd]

One influence upsetting the balance of this [æ] phoneme is doubtless the pull of the stage pronunciation of such words as *chance*, *path*, *can't*, etc. Another may be the accumulation of homophones such as: *can't* and *cant*, *ant* and *aunt*, *have* and *halve*, etc. These two influences are making a definite place in American English for [a].

In the conflict of styles, therefore, the direction of evolution is determined not only by the influence of the social, political, financial, and cultural leaders of a given community but also by the internal conflicts within the language itself. Leadership may produce a given change, which may in a succeeding generation produce another change that is quite separate from the style set originally by the leader or leaders who started the evolutionary wheels in motion; each change tends to upset the balance that has been achieved in the dialect. Other changes take place to re-establish the balance and they in turn start still other modifications. Thus a language is constantly in a state of flux and is never static until it ceases to be the language of the people and becomes only the language of the scholar and teacher. The more definitely a language is limited in its use to the initiates and to those members of an intellectual aristocracy who use it more or less exclusively, the more static it becomes; and the more a language is allowed to escape from the classroom and from the printed page, the more rapidly these processes of balancing and re-balancing take place.

Hence we should expect the unschooled pioneer, whose chief concern is the wresting of an economic security from the forces of nature, to modify his language rapidly, and the Roman Catholic priest or the Hebrew scholar to retard the evolution of the pronunciation of Latin and Hebrew, since they employ these languages with great care to preserve forms that they regard as proper and correct. Such languages achieve a balance that remains more nearly fixed than the living language of the person to whom a language is only a commonplace tool.

SECTION FOUR

AMERICAN SPEECH STYLE

Chapter 16

American Speech Style

In the preceding section we discussed factors that were responsible for phonetic changes. We now come to the matter of the crystallization of these changes when and where they do take place. This factor is that of style. Just as in the architecture of our houses, the design of our automobiles, and the cut of our garments, so in the phonetic clothing of our thoughts we are influenced by what "they" do. "They" are the leaders. In speech those who set the style are the cultured, those who have travelled, the politically powerful, the educated, the wealthy, the socially influential, and the professional users of speech—preachers, teachers, actors, lecturers, and radio speakers. This setting of the style is usually not done consciously and deliberately, but is accomplished indirectly through the leadership these influential groups exert.

1. Aspects of Style

There are two aspects of any style: the example set by the leader, and the emulation of that example by a significantly large body of followers. Until both of these aspects have made themselves manifest, no style has been created. In speech the example, when it is first brought to the attention of the follower group, may even be regarded as in poor taste—as, indeed, it often is; yet, if the influence of the leader be powerful enough in other realms than speech, the masses may come in time to accept his speech example in spite of their first feeling that he is "incorrect" in his speech forms. When they do accept the example, even though they may not follow it, a style has been set. It often happens, therefore, especially in America, and even also in England, that one comes into a position of speech leadership not through any special inborn ability, training, or interest in diction, but through his skill with the scalpel, or his wife's social leadership, or his father's accumulated fortune. The style of speech that he sets in his community would, if it were not for his social position, remain as it was when he learned it from his mother and father, a purely provincial and homely form, perhaps, not bearing the marks of that thing we call "the mode." Thus a form of speech that in one generation smacks of the rustic and uneducated, in another suggests the elite.

An analysis of the mode in any realm, reveals that it is not what the masses are doing today, but what the masses may do tomorrow. That is, style is always one step ahead of general practice; it is a body of prevailing or successful influences. One cannot be sure, therefore, whether a given form is in good style until that form has stood the test of time. There are speech fads as well as speech styles.

Another aspect of style is the emphasis that it places upon difference: differences between what those in *this* community do and what those in *that* community do, differences between what we do *now* and what we did *yesterday*, differences between what the *cultured* do and what the *uncultured* do. In fact, if any practice becomes absolutely universal in a given area it is no longer a matter of style. Thus a practice that in one region is not stylish, but commonplace, may become a factor of style in an area in which the practice is novel, provided the people of the former area begin to influence strongly those of the latter. No style, then, can be adequately described except in terms of the differences it shows either from some rather general practice or from various provincial, local, or class practices.

2. STYLE AND THE COMMUNITY

Considered narrowly, there are *general styles* on the one hand, and on the other, *local styles* or *dialectal trends*. In the past an isolated community inhabiting a secluded river valley fertile enough to make the community self-supporting, has normally developed styles of its own. Of recent years, however, certain factors have broken down the barriers that separate these communities from the world and have begun to introduce into them more nearly universal styles. So far as speech is concerned these factors are the telephone, the radio, the automobile, and the motion pictures—they subject the speech of otherwise isolated communities to the influence of distant styles. Whereas once the tendency was for a given language to become more and more broken into dialects, now a definite check upon that tendency, and perhaps a reversal of it has set in. However, though they can break down physical barriers, these modern influences are by no means as potent against social and economic barriers—class segregations based on such things as wealth, education, politics, religion, family, occupation, race, or nationality. As a consequence, the radio, the telephone, and the paved road can scale mountains and span rivers for some, and thus tremendously enlarge their community, while for others these agencies have little, if any, influence. Hence in a given neighborhood there may dwell persons who are really living in communities of different sizes. The Gulla cotton picker on the South Carolina Islands lives in a community no larger than one can traverse on foot while his foreman's community includes Charleston and the environs, and that of his proprietor may include many states. The broader one's interests and the greater his ability to reach out and touch distant parts of the English-speaking world, the larger his community; and the larger one's community the more cosmopolitan the styles by which he may be influenced.

It follows, therefore, that two persons living in the same area, both following the community style, may exhibit quite divergent speech uses. This is the way class distinctions in speech forms grow up. In the evolution of these distinctions, greater influence is naturally exerted by those who live in the city, since cities are at the crossing of paths of travel; and city dwellers of a given class get larger and longer vistas into the world around them than do country dwellers of the same class. Thus in speech as in most other matters of style the country mouse is likely to stand humble in the presence of the town mouse.

The most effective physical barrier in the setting of one group against another, and in the attendant development of divergent styles, is the ocean. Hence the English speech of one continent differs from that of another, and we can discern a general English style for a given continent as different from that of another. That means that a person whose community is the United States of America will be exposed to speech styles which differ in many particulars from those of British South Africa. A statement of the difference of use between these two speakers will be a partial description of the styles of the two continents.

The development of an English style is often influenced by the patterns of speech of another language. While the two languages are spoken side by side we refer to the effect of the foreign tongue upon English as a brogue,[1] accent, or foreign dialect. When, after generations, the foreign language has disappeared and has left its imprint upon English, that form of English is said to have a local or special dialect. The English of an Italian-born Pittsburgh factory hand is a foreign dialect, while that of the Pennsylvania German is an example of the foreign dialect changing into a local dialect. The English of the lowland Scotsman is an example of a survival of a foreign influence after the original language has quite disappeared as a native tongue, leaving a local dialect.

We should distinguish between *styles* and *dialects*. Viewed from one helpful point of view, styles are advances, changes from the practices of yesterday, influences that cause persons consciously or unconsciously to adopt speech forms different from those of their parents. Dialects, from this point of view, are survivals of successful styles.

3. Speech Styles and Cultural Stereotypes

Differences in speech styles often become so linked with social, racial and national differences that the lay person does not separate the speech style from its associates. Thus in his mind a given set of speech forms connotes a given race, nation, or social culture. If the hearer is a naive lay person whose speech discriminations are for the most part on a subconscious level, he will like that speech style that connotes the racial, national, and social status that he favors, and he will dislike that speech that connotes the conditions of life he dislikes.

Many persons rationalize their likes and dislikes in speech styles on a basis of what they regard as inherent beauty or ugliness of certain sounds or sound combinations; but it is doubtful if any considerable part of the esthetic value of a vocable is inherently resident within it. It is esthetically attractive when it is employed in a word with a pleasant, comfortable, or inspiring connotation or if it is a vocable used uniquely by a group of speakers whom the hearer admires, respects, or deems socially worthy. The sound or sound combination is regarded as uncouth and ugly when it is employed in a word or phrase that connotes something painful, disgusting, immoral, or cowardly, or if it is commonly used by persons regarded by the hearer as socially unworthy. It thus happens that the same speech forms will arouse quite different reactions from different hearers depending upon their differing experiences. If one's experience with a given speech style is entirely through his contact with speakers who are haughty, supercilious, insincere, and superficially cultured, that style will seem to the hearer to be intrinsically inferior; but if one's contact with that same style is with people who are kind, tolerant, genuine, and deeply cultured, it will seem intrinsically superior and worthy of emulation. If one's contact with immigrants from a given country is limited to those who are uneducated, immoral, criminal, or uncultured, the dialect that is typical of the language of that county will seem a thing that one should avoid imitating at all costs; but if one's contact with immigrants from that county is limited to those who are educated, travelled, and cultured, that same dialect will be a pleasant one—one that gains for the speaker the hearer's immediate respect.

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[1] Strictly, and originally, *brogue* refers to the Irish dialect, but the word has assumed more universal significance.

In England, much more than in America, class distinctions are marked by differences in dialect or speech style. H. C. Wyld says:[2] "Everyone knows that there is a kind of English which is neither provincial nor vulgar, a type which most people would willingly speak if they could, and desire to speak if they do not. . . . I suggest that this is the best kind of English, not only because it is spoken by those often very properly called 'the best people,' but because it has two great advantages that make it intrinsically superior to every other type of English speech—the extent to which it is current throughout the country, and the marked distinctiveness and clarity in its sounds."

We question the process of rationalization by which Mr. Wyld arrived at his second "advantage." Since he belongs to that class referred to as the "best people," he is hardly in a position to speak without prejudice about the intrinsic superiority of his own speech. It must be observed, however, that many, perhaps a majority, of those Britishers who do not use the standard forms of speech of the "best people" would gladly endorse Mr. Wyld's opinions. They would heartily disapprove of the use, by one of the upper class, of local, cockney, or provincial speech forms; in fact they would suspect the genuineness of the claim to breeding of one whose speech was strongly marked by provincialisms. Mr. Wyld says further: "The 'best' speakers do not need to take thought for their utterance; . . . they have perfect confidence in themselves, in their speech, as in their manners. For both bearing and utterance spring from a firm and gracious tradition. 'Their fathers have told them'—that suffices." And Mr. Wyld's inference here is that others, who have not had the advantage of hearing and speaking standard speech from childhood up, cannot master it so as to sound convincingly upper-class.

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[2] *The Best English.* S.P.E., Tract No. XXXIX. Oxford University Press, New York.

In America class distinctions are less rigid than in England, but to the extent to which class lines are drawn, speech distinctions develop to characterize the classes and distinguish one from another. As the country grows older class distinctions will doubtless increase rather than decrease; at present, however, the only speech distinctions of class that manifest themselves the country over are between the "professional" class and the "laboring" class, and even between these classes the distinctions are perhaps more in grammar and vocabulary than in phonetic diction.

In America distinctions in speech are correlated more with place of rearing, and nationality. If one has been brought up in an area of the country generally thought to be inhabited by ignorant and uncultured folk, he will do well—at least in talking to persons outside of his native area—to avoid the more obvious of the localisms of this area, for those localisms will have acquired an inferior social standing. Or, again, if one has been reared in some colony of foreigners who are generally, even though mistakenly, believed to be uncouth, one should avoid their dialects. If, on the other hand, one has been reared in a community or among a group of people generally noted for their culture and good breeding, one may safely continue to use his native localisms anywhere, since his speech peculiarities will have high social standing.

Travellers from the Mid-West are often impressed with the apparent difference in culture between the man-on-the-street in Boston and the man-on-the-street in Chicago. Why? For two reasons: (1) Boston is thought of as the home, not only of baked beans, but of the *Atlantic Monthly* and the New England aristocracy, while Chicago is thought of as the center for railroads, gangsters, and the packing industry. (2) The mid-westener has usually not heard Boston speech except from the lips of the educated and cultured—the other Bostonians have remained in Boston. Hence in the Mid-West the Boston accent suggests the elite. When this dialect is imported westward it may be resented—it usually is resented when it is brought back by a mid-westerner who has gone East and then returned to his native state. Nevertheless, it still stands for aristocracy. The resentment is for affectation on the part of the speaker, not for the speech forms themselves.

4. NORTH AMERICAN SPEECH STYLES

On this continent speech style has had an interesting history. The continent was settled by peoples speaking diverse languages. Eventually those who spoke English prevailed, and the country passed through a period of unification of speech uses. When, however, the colonies along the Atlantic seaboard began to send pioneers westward to settle remote and isolated communities, unification of language gave way to divergence and variation. The more self-supporting and independent these isolated communities became, the less intercourse they needed with the other parts of America, and the more definitely local and special their several dialects became. These differences in speech were augmented by the vast numbers of immigrants that poured into the country, who often established themselves in isolated communities of their own kind.

This era of divergence lasted until well into the twentieth century, but its decline began with the development of the railroad systems, which connected river valley with river valley, and seaboard with seaboard. The railroads not only made possible the mixing of speech cultures by transporting citizens from place to place, but they also introduced a new speech influence in the from of travelling dramatic companies who brought to each community, not local styles from other parts, but a more standardized form of speech not typical of any American community, but closely modelled after that of the British stage. Thus local and provincial dialects became widened and fused until those communities that had the greatest amount of intercourse with each other began to develop styles common to all the communities of a given area. So we developed "Eastern" speech, "Southern" speech, and "Mid-western" speech. As the people of each of these areas became conscious of their differences of speech forms, they began to search for the answer to the question, "Which form is correct?"

Then there arose a group of evangelical phoneticians who strove to superimpose upon the speech cultures of America a national speech standard, a "correct" form for North and South, East and West. This movement for a "Standard Speech" was lost in the rapid speech changes that came with the perfection of the long-distance telephone and the development of the radio, the talking motion-pictures, the automobile, and fast roads. These instruments of communication not only routed the "Standard Speech" movement, but they are also now rapidly tearing down the differences between the major speech areas of the country. We are therefore on the way toward the development of a common speech for America, not *the* "Standard Speech" *superimposed upon* the people, but *a* standard speech *arising spontaneously from* the people.

Although this unifying influence has pervaded the entire continent, there are today sufficient survivals of local styles to enable us to delimit certain speech areas. We must recognize that although in each of these areas the majority of persons today show an influence more definitely general American than local, it is the few characteristic speech forms of this majority that enable us to outline each general area. The speech of small minorities, consisting mostly of elderly persons from native families, exhibiting the local styles of yesterday, provide the data on the basis of which we can describe the special speech forms of each area.

Roughly, allowing for a great deal of overlapping, these areas are: the Eastern area, along the Atlantic seaboard from New Brunswick to

Delaware, including a rather narrow strip through New York, New Jersey, and Delaware, and a much deeper section through the New England states; the Southern area, the area of the Confederacy together with Maryland and the southern and mountainous portions of West Virginia; the French Canadian area—the province of Quebec and Eastern Ontario; the British area—Canada west and the north of Ontario. Scattered over the country are also many smaller areas in which the speech forms are so narrowly local or foreign as to deserve distinction from the larger areas in which they are located. Such are the areas of "Cajun" French in Louisiana, the Pennsylvania "Dutch," the Milwaukee German, the Spanish dialect of the Southwest, and others.

Thus the division of the continent into areas does not mean, for example, that all those living in Canada to the west and north of the Ontario borders have a British accent. It means rather that, comparing that area with others on the continent, the characteristic difference, in so far as one exists, lies in the fact that of all the many dialects spoken in this vast Canadian area, one can trace most often the influence of British speech forms. It means that although in the South we may hear Jewish, German, French, or Spanish dialects, these dialects are not the ones that make it possible for us to distinguish the South from the East—the East too has these same dialects. The South has, however, in addition to the dialects mentioned, a dialect that is characteristically different from that of the other areas. This difference is so characteristic that, if a person speaking such a dialect is heard in Chicago, one remarks, "There is a Southerner."

The dialect spoken most generally in the area not included in the Eastern, Southern, French Canadian, and British Canadian areas may be called a *general American* dialect. It is of course as much a regional dialect as any of the others, but its area is large and is increasing while that of the other dialects, with the possible exception of the French Canadian, is decreasing.

Western Ontario provides an interesting example of the competition of dialects. That section has much commerce with the United States that brings with it general American speech influences. French Canadians are crowding in from the East, bringing their dialect. There is much travel to and from England, and on the international border, as well as in urban centers, many government, church, and business executives and clerks are British. They bring with them various British accents. One must not overlook, too, the fact that since the British flag flies over Ontario the British accent thus has the advantage of a strong favoring prejudice. But apparently today the general American influence is strongest.

The general American dialect is geographically the most widely distributed and influences a preponderant and increasing majority of North Americans. We should distinguish between this general American dialect and general American style. The *dialect* is the form of speech actually most typical of a large area of the continent; the *style* is that body of prevailing influences that is modifying the English of the entire continent. Some of these influences are from one dialect area and some from another, a large portion coming from the general American dialect. In the contact of dialect with dialect, the general American dialect is modified, just as are the other dialects, by the general American style.

Now to recapitulate before going on to discuss the characteristics of general American style: Style in speech designates those critical differences in diction between area and area, class and class, generation and generation, that are favored by, are a part of, or are incorporated into the speech of the leaders of their communities and are, or become, habitual speech forms of a significantly large number of followers of these leaders. The speaker's community has both geographical and social boundaries; that is, though persons living side by side are usually to be thought of as in the same speech community, it often happens that they live in quite separate communities, and persons who dwell hundreds of miles apart may be thought of as living in the same community. It is even possible that a person may speak two dialects of English in order to make satisfactory adjustments to the styles of two communities of which he is a member. It is also possible that as a result of the influences of two leaderships, two divergent forms or speech practices may be in good style in a given area—such forms, for example, as [hjumɝ̣] and [jumə] for *humor*.

5. The Purpose of This Section

In discussing style we shall not concern ourselves with gross differences between speech usage, such as those of grammar, and vocabulary; nor shall we treat of differences in pronunciation that clearly exhibit two parallel forms, such as the following:

Apparatus	[æpəræts] [æpərejtəs]
Either	[ɑjðə] [iðɜ̣]
Adult	[ædʌ̣lt] [æ̣dʌlt]

We are not concerned with such words as may be included in a list of "1000 Words Commonly Mispronounced," since in every case the words show forms so divergent as to constitute virtually two words for the same idea. We prefer to leave to others the question, for example, as to whether *again* is [əgɛn] or [əgejn]. Suppose it is decided that the second vowel should be the so-called short *e*; the phonetician is concerned with (1) analyzing the various pronunciations of those who employ this *e*, and (2) determining, if possible, which of the various forms are in best style. In general American style is the second vowel definitely [ɛ]? Is it nearer to [æ]? Is it nearer to [ɪ]? Is the second vowel nasalized? Is the stress on the second vowel markedly greater than on the first, or is it nearly the same as upon the first vowel? Suppose those who decide matters of pronunciation have determined that the second vowel should be the long *a*; then, in the impact of various dialects, what happens to the utterance of the word? In addition to matters of stress and nasalization, the phonetician must consider here the treatment of the "diphthong." Is the second vowel a definite glide, or is it really an [e] with a slight off-glide? If it is a clear glide, is the first element [e] or [ɛ]? Does the second element have the quality of [ɪ] or of [i]? What is the preferred general American style for the long *a* pronunciation of this word?

Thus it might be said that phoneticians are concerned not with which of two markedly different forms of a word should be used, but rather with how the chosen form is uttered. As to the use of vowels, this means that the phonetician is concerned, not with which phoneme to use in a given word, but rather with the member of the phoneme used in such a word as spoken in a given dialect or according to a given style. As to the use of stress, it means that the phonetician is concerned, not with which syllable to accent, but rather (1) with the type of stress, force, duration, pause, etc., employed on the stressed syllable, (2) with the degree of stress, and (3) with differences in the vowels caused by differences in syllabic stress.

Certain matters of utterance change more rapidly than others. In general, vowels are more unstable than the consonants. We talk about the great vowel shift that followed the mixing of French and Anglo-Saxon forms. As a matter of fact, we are constantly in the midst of a vowel shift. Styles of the pronunciation of the consonants move much more slowly, and trends are more difficult to discern. Consequently, most of what we shall say about styles of utterance will concern itself with the utterance of the vowels.

Chapter 17

The American Style

As has just been suggested, one cannot discuss any style without showing its differences from other styles. Hence, in discussing the general American standard we shall need to discuss also local and provincial styles as well as the speech of the stage and the speech of other English speaking countries. Out of the speech forms of the various dialects other than the general American will be selected those that seem to the writers to be used with increasing frequency in the general American area; and out of the forms of the general American dialect will be selected those that seem to be spreading to other dialects and are thus gradually extending the limits of the general American area. Any discussion of style, in speech or any other human conventions, must be of the nature of a prophecy of future uses as well as a survey of present practices. The way of the prophet is hard. After all, he can only record his prophecy and wait for developments. He cannot hope to be right in all details of his prophecy. Since the English language is a living, growing thing, style must be concerned with trends. Only a dead language has a fixed style.

1. The Purity of the Vowels

An almost invariable characteristic of regional and local dialects in America is the tendency to make glides of vowels that are thought of by the speaker as pure vowels. Each area recognizes these characteristics of another region but is unaware of its own "drawls." The man who changes [kæt] to [kæət] does not notice what he is doing, but he does recognize the glides in *ask*, *camp*, and *tall*, when persons from other regions speak them as [æjsk], [kæəmp], and [tɔwəl]. If all the regional dialects had the same glides, they would pass unnoticed; but since the vowels affected differ so markedly, they are brought to the hearer's attention when persons from different regions converse. A common element, therefore, among the dialects is the group of pure vowels. In the contact between dialects this common factor increases, and glides tend to disappear. Thus the general American style is toward purity of vowels. The following list illustrates glides used in various regions in place of the customary pure vowels.

Vowel	*Glide*	*Local Dialect*	*Sample Word* (General American Style)[1]
[i]	[ɪi]	[sɪi]	[si]
[ɪ]	[ɪə]	[sɪət]	[sɪt]
[ɛ]	[ej]	[flejʃ]	[flɛʃ]
	[ɛə]	[rɛəd]	[rɛd]
[æ]	[æə]	[hæət]	[hæt]
[a]	[æj]	[klæjs]	[klas]
[ɑ]	[ɑə]	[kɑəm]	[kɑm]
[ɔ]	[ɔw]	[kɔw]	[kɔ]
[ʊ]	[ʊə]	[kʊəd]	[kʊd]
[u]	[uʊ]	[suʊn]	[sun]
	[ju]	[tju]	[tu]
[ʌ]	[ʊʌ]	[mʊʌd]	[mʌd]
[ɜ]	[ʙj]	[d͡ʒɜjzɪ̣]	[d͡ʒɜzɪ̣]
	[ɔj]	[θɔjd]	[θɜd]
[ɝ]	[ʌr]	[bʌrd]	[bɝd]
[ʟ]	[əl]	[lɪtəl]	[lɪtʟ̣]

2. Standardization of the Glides

As the obverse of the picture of the pure vowels, we find the glides that are recognized as such in general American style to be clear cut and definite in comparison with those heard in many local dialects. These standard glides may be divided into four classes: *w*, *j*, *r*, and *l* glides, receding, or diminuendo in type.

The *w* glides are [ɑw] and [ow]. [ɑw] has variant beginning points in American dialects. Thus *house* is heard as [hæws], [haws], [hʌws],

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[1] In some cases other forms are also in good general American style, since there are many alternative forms both of which are in good style.

[hɒws]. [ɑw] seems to be the most used in the general American dialect and seems to be superseding the [aw], [ʌw], and [ɒw] glides in the other regional dialects. In many dialects the [ow] glide appears almost a pure [o]. Other forms that it takes are [oə] and [ɜw]. The latter pronunciation shows a strong stage and British influence. The prevailing trend is toward [ow].

The *j* glides are [ej], [ɑj], and [ɔj]. [ej] becomes [e] in many dialects where foreign influences have been operative, such as Italian, French, and Gaelic. The [ɑj] glide in words like *time*, *I*, *my*, etc., in many American dialects, is shortened to what are practically pure vowels [ɑ], [a], or [ʌ]. In other dialects, its beginning and ending points vary so markedly that its sonorous initial vowel appears as [a], [ʌ], [ɜ], [ɒ], [ɔ], or [æ], and its less sonorous final vowel as a schwa not possessing a recognizable [j] resonance. It seems likely that the [aj] of Eastern, British and stage speech will be superseded by the [ɑj] of the general American dialect. Thus in general American style the glides in the words *my house* begin with the same vowel [ɑ].

[ɔj] is heard in some parts as [ɔj] and in others as [oj]. A definite [ɔj] seems to be the prevailing trend for this diphthong.

The receding *r* glides are [ir], [ɪr], [er], [ɛr], [ær], [ɑr], [ɒr], [ɔr], [or], [ʊr], [ur], and [ʌr]. [ir] and [ɪr] tend to fuse into one phoneme in general American style, so that *peer* and *pier* are pronounced alike. Probably the place of beginning of this glide is somewhere between [i] and [ɪ]. The "diphthong" [ɛr] is heard in some dialects as a triphthong, so that *care* becomes [keər] or even [kejə]. In some dialects distinctions are made between the *r* glides in *Mary*, *merry*, and *marry*, but in general American style these distinctions are not usually made, [ɛr] being used in all such words, though sometimes this glide is nearer to [er] than to [ɛr]. The glide [ɑr] varies in its beginning vowel, from [a] through [ɑ] and [ɒ] to [ɔ]. [ɑ] is clearly the mode for such words as *hard*, *dark*, *sergeant*. [ɒr] as in *borrow* and [ɔr] in *sort* in general American style usually become fused into one phoneme whose place of beginning is quite variant, roving from nearly as low as [ɑ] to nearly as high as [o]. [or], though usually treated in the general American dialect as a separate glide often becomes confused with [ɔr] or [ɒr], so that *glory* varies in its beginning vowel from [ɒ], through [ɔ], to [o], or even to

[ow]. [ʊr] and [ur], like [ir] and [ɪr], are fused into one phoneme, which has as its beginning point a sound perhaps half way between [u] and [ʊ]. This is the general American style for the pronunciation of *poor*, *sure*, and *tour*.

The ending points of these *r* glides vary from [r] to [ə]. Hence we have in some dialects *dear* [dɪə], *care* [kɛə], *card* [kɑəd], *cord* [kɔəd], *poor* [puə]. In some dialects, also, the schwa endings of the *ar* and *or* glides become so attenuated as practically to disappear, leaving us [kɑːd] for *card* and [kɔːd] for *cord*. Though the present practice in the general American dialect favors the [r] endings for these glides, the trend of style seems to be toward some schwa softening of the [r].

r glides formed by combining [ow] with [r] often lead to triphthongization or to the addition of an unstressed syllable to complete the transition. So *more* becomes [mowər] in some dialects and [mowə] in others, and is thus indistinguishable from *mower*. The trend of general American style seems to be to avoid either of these alternatives by omitting [w] from such combinations. Thus *mower* is [mowər], but *more* is [mor].

We have the following receding *l* glides: [il], [ɪl], [el], [ɛl], [æl], [ɒl] [ɔl], [ol], [ʊl], [ul], [ʌl], [ɜl], [ɝl]. In general American style, they are markedly distinct from each other, with little overlapping of phonemes. In many dialects of the East and South, the first five of this list employ a clearer *l* than do the rest, but in the general American dialect the dark *l* is used. In some dialects there is a tendency to interpose a schwa between the vowel and the *l* thus making *wheel* [ħwiəl], *bell* [bɛəl], *furl* [fɝəl], and *pool* [puəl]. There is a strong tendency in many dialects of the North American continent to lower the [ɒl] glide to [ɑl], in such words as *Polly*, *jolly*, and *solemn*. The pull of style, however, seems to oppose this lowering.

Just as the ending points of certain *r* glides change from [r] to [ə] and then the [ə] disappears, so with certain *l* glides the [l] changes to [ə], and then [ə] becomes so softened as to disappear. In fact, this evolution of the *l* glides has gone farther than that of the *r* glides, and has already become the mode in most American dialects for such words as *calm*, *walk*, *almond*, and *chalk*. Even *yolk* is heard pronounced without the *l* by many careful followers of the general American style. The evolution of the disappearing *l* may be illustrated thus: [wɔlk], [wɔə̣k], [wɔk].

l glides made by combining either [ej] or [ow] with [l] follow the same principle as combinations of [ow] with [r], viz., many regional dialects make triphthongs of the combination, or add a syllable to complete the glide. Thus *pale* becomes [pejɪ̣], and *pole* becomes [powɪ̣] or [powəl]. The increasing American trend is toward [pel] and [pol].

3. The Use of Compromise Vowels

The third tendency of general American style concerns the use of intermediate or compromise vowels. The influence of the radio, motion pictures, the automobile, is being felt in the increasing use of the vowel [a] as between [æ] and [ɑ], [ɒ] as between [ɔ] and [ɑ], and [ɜ] as between [ɝ] and [ʌ]. The desirability of the compromise vowels arises from the fact that our world is so rapidly decreasing in size that persons are brought together who pronounce many common words so differently as to seem conspicuous when conversing. In order to avoid conspicuousness, compromises are developed, consciously or unconsciously.

The [a] compromise between [æ] and [ɑ] makes use of a sound that has been used in other connections in many local dialects. It is the vowel that the Scotsman is likely to use in *man*, or the Irishman in *father*, or the citizen of Maine in *dark*. It is also the vowel that many "affected" persons use in *and*, *hand*, *fat*, *sat*, etc. As a compromise vowel it is used in those words that are pronounced [æ] in midwest American and [ɑ] in stage speech, such as *branch*, *half*, *class*, etc.

The [ɒ] compromise between [ɔ] and [ɑ] is used for the so-called "short *o*" and for many "broad *a*'s" following *wh*, *w*, or *u*—for example, *long*, *rot*, *soft*, *swab*, *squad*. A number of words vary, in different dialects, between [ɔ] and [ɑ], such as *God*, *coffee*, *hospital*, *watch*, *wasp*, *hog*, *frog*, *fog*, etc. The compromise vowel [ɒ] has its greatest significance in the pronunciation of words of this sort. As the use of this vowel increases, it not only pulls many words away from the [ɔ] and [ɑ] phonemes, but it also captures some of the words whose vowels are pronounced [ʌ] in regional dialects, such as *what*, *was*, *want*, etc.

The [ɜ] compromise between [ɝ] and [ʌ] takes its significance and usefulness from variant pronunciations of words like *burst, sir, girl,* etc. For the speaker who has been brought up to say [tʃʌtʃ] for *church,* the midwest [tʃɝtʃ] would not come with ease. In fact, his self-consciousness in uttering it would make the word conspicuous. The compromise [ɜ] is the resolution of his apparent dilemma, although we may guess that the final compromise will be a bit closer to the [ɝ] of the general American dialect than is the present Eastern [ɜ].

In the speech of foreigners the umlauts [ø] and [œ] often substitute for [ɜ], since acoustically they are so close to it. In many dialects this compromise vowel becomes a glide [ɜj], so that *shirt* becomes [ʃɜjt] and *absurd* becomes [æ̣bsɜjd].

4. THE INDIVIDUALITY OF THE UNSTRESSED VOWELS

The various dialects of English differ in their treatment of vowels in unaccented syllables. The French-Canadian dialect goes to the opposite extreme in giving the unaccented vowels distinct individuality. Take *possibility,* for example: In the Mid-West it would be [pɑsəbɪlətị], while in French-Canadian it would sound like [pɒsɪbilɪtɪ]. In the blending of dialectal influences into a general American style the trend seems to be about half way between these two practices. The following list gives examples of these various pronunciations:

The Indefinite Schwa Pronunciation	*General American Trend*	*A Level Stress*
[əvɛnt]	[ịvɛnt]	[ivɛnt]
[sɛnət]	[sɛnɪ̣t]	[sɛnejt]
[lɛtəs]	[lɛtɪ̣s]	[lɛtʌs]
[wɒntəd]	[wɒntɪ̣d]	[wɒntɛd]
[drəmætək]	[drạmætɪ̣k]	[dramatik]
[əbɒləʃ]	[æ̣bɒlɪ̣ʃ]	[æbɒlɪʃ]
[pətejk]	[pɝ̣tejk]	[pɑrtejk]
[pətejtə]	[pətejtọ]	[powtejtow]
[fɑðə]	[fɑðɝ̣]	[fɑðɝ]

One of the interesting facts about the schwa as used in America is that the speech styles of different areas vary both in the sound units and in the contexts in which this indefinite vowel may be employed. One group of speakers would always pronounce *menace* as [mɛnɪ̣s], never as [mɛnəs], but would pronounce *reader* [ridə], and not [ridɝ̣]. Speakers, on the other hand, who say [ridɝ̣] would be likely to say [mɛnəs]. Others who would pronounce *ability* as [əbɪlɪ̣tɪ̣], never using a schwa in the third syllable, might pronounce the word *tallow* as [tælə] rather than as [tælo̩]. It is this inconsistency of use of the schwa that causes it to be displaced by vowels that have more definite values. Whenever the schwa is used in a given sound unit or context, and is so used in all American areas, such use will remain; but in those units and contexts in which the schwa differs from area to area the schwa will be displaced by other unstressed vowels. The use of the schwa in English is widespread, but the purposes for which it is used vary greatly. In the fusing of one dialect into another, one may expect, therefore, a decrease in its use; for, so far as the vowels are concerned, the common factor that binds dialect area with dialect area is not the schwa but the definite forms of the several vowels.

These common uses of the schwa are surprisingly few: in final unstressed syllables spelled *al*, *ul*, *ol* as in *regal*, *awful*, *symbol*; in unstressed syllables in which the vowel would, if stressed, be [ʌ], as in *caucus*, *submit*, *circumstance;* and in word endings spelled *cion*, *tion*, *sion*, *tia*, *sia*, *cia*, *cean*, *tious*, and *cious*, as in *mission*, *ocean*, *vicious*. In all other contexts, and sometimes even in those mentioned above, the schwa uses in one area differ from those in another, so that a syllable pronounced in one area with an undeniably indefinite vowel will in another be pronounced with a resonance that is clearly that of one of the standard vowels. Thus, if modern forces bringing the speech of one region in contact with that of another were not now operative, our language, marked as it is by a vigorous alternation of stress, would evolve so rapidly in such different directions in different areas that one dialect would become unintelligible to the speakers of another. The present forces, however, are tending to reverse this evolution and to reduce the number of schwa uses.

Another factor that is constantly operative to reduce the frequency of the schwa is the rather unintelligent use of the pronouncing dictionary. The reader of the dictionary too often fails to read the introductory remarks about the pronunciations indicated for the words defined. The writer of the dictionary specifies usually that the forms given are for formal, careful and discriminating utterance. He explains further that in informal situations less careful and less precise pronunciations may be quite acceptable. He may even point out that from area to area there may be acceptable differences of pronunciation. The user of the dictionary, however, is often in too much haste to determine the "correct" pronunciation. The pronouncing dictionary usually represents the unaccented vowels in their most discriminating forms, and hence the user of this dictionary gains the impression that no other forms are acceptable. It is probably impossible to avoid the careless use of dictionaries, and certainly pronouncing dictionaries are necessary. Hence we must recognize that this factor will be an ever present and constant influence in the direction of greater discrimination among the various unstressed vowels.

In summary, the principle to be stated here is that general American style shows two marked tendencies: (1) to give each unaccented vowel some of the quality of one of the standard vowels (though not necessarily the quality of the vowel that would be employed if the syllable in question were to be definitely stressed); and (2) to use the indefinite and nondescript schwa sparingly. It must be said that this principle is a relative one. It means that the use of the schwa is increasing in some areas and decreasing in others. For the great body of inhabitants of the United States of America, however, the pull of style will doubtless be in the direction of greater individuality of the unaccented vowel, since the majority of our speakers employ the schwa so prodigally that it becomes by far their most frequent vowel, perhaps one out of every four vowels in connected speech being schwa.

5. The Discrimination Between the Vowels and the Voiced Nasal Continuants

One of the characteristics of American speech in general is the assimilation of the vowels with preceding or succeeding [m], [n], and [ŋ]. The practice of this type of assimilation is so common in America that it is not recognized by Americans. In fact, when the Englishman characterizes our speech as nasal, the American is inclined to resent the characterization and to think the Englishman speaks from lack of knowledge of American uses. He is inclined to feel that the critic had limited contact with a few Americans whose speech is not typical of the general practice. He may be surprised when he happens upon a phonetic transcription of American speech (written by an Englishman for British readers to show how Americans actually talk) to note that the author includes a warning that all vowels preceding or succeeding the nasal consonants are to be read as definitely nasal vowels. Whether or not this is an accurate representation of American speech, the fact remains that this nasalization is one outstanding difference between the cultured speech of the British and the cultured speech of Americans. London is not the political capital of the entire English speaking world, but nevertheless it has been and doubtless will remain for a long time the linguistic capital of such a world. Pronouncements, styles, and conventions emanating from the cultured speakers of London and from its academies and universities have great weight in setting the styles of speech not only in the Empire but in English speaking countries not politically dependent upon London. The influence, therefore, of the British speaker who makes careful distinctions between the nasal and the non-nasal sounds is felt in America.

It is doubtless possible to produce a vowel that is partially delivered by way of the nasal chambers without giving it so-called nasal resonance, but if the passageway into the nasopharynx is greater in size than is afforded by a very slight lowering and retracting of the velum, the vowel so produced will have a nasal quality. Thus, if, while uttering the vowel, one anticipates the articulatory adjustment necessary for the nasal sound that immediately follows, the vowel itself will become nasalized. Or if the velum is not raised definitely so as practically to close the naso-pharyngeal port when one makes the transition from a nasal consonant to the succeeding vowel, the vowel will again be nasalized. It is in these ways, doubtless, that the American nasalization is produced and this is why the "Yankee" is said to "talk through his nose." Many "Yankees" carry over this nasalization to other vowels that are not preceded or followed by nasal consonants so that not only do they show this "assimilation" nasality but a general nasal quality on all vowels, due doubtless to the fact that the naso-pharyngeal port is allowed to remain markedly open on all sounds that do not actually require the building up of real air pressure in the cavity of the mouth.

In spite of professed admiration for the sincere Yankee type, the average American has a secret respect for the more cosmopolitan type represented by the travelled Englishman; and shows his respect in this matter of nasalization by reducing the nasalization on the vowels. The nasalized pronunciation of the word *on*, for example, makes for a combination of sounds that is practically a nasal diphthong so definitely does the first sound blend with the second. *No* becomes a triphthong—the [n] blending into the [o] as smoothly as [o] blends with the final vowel [ʊ]. With increasing frequency, however, Americans are making a sharp distinction between the *n* and the preceding or succeeding vowels so that the place of transition is as definite as though the words were *odd* and *doe*.

6. Avoidance of the Secondary Stress

The English language has developed a definite tendency toward marked differences in stress between syllables of a given word. Among the major languages of the world it stands almost at an extreme in this regard. Yet in various parts of the English speaking world there is great divergence of practice in the use of this stress. Perhaps nothing so drastically changes the character of an English word as a definite change of stress. Were English not so markedly accented, these differences would be relatively insignificant, but when the person who is used to pronouncing *laboratory* with a stress upon the first syllable hears it pronounced with the primary stress upon the second syllable, he is surprised, and the word becomes to him strikingly conspicuous. The American practice of employing the secondary stress on such words as dic′tion-a′ry, tran′si-to′ry, mis′sion-a′ry, mi′gra-to′ry, sac′ri-fice′, dif′fi-cul′ty, tel′e-gram′, or′gan-i′za′tion, is definitely counter to the British and stage practice of one single stress for each word unit. The American practice also of even stress on such words as *program*, *chlorine*, *chaos*, *research*, also runs counter to the practice of stressing these words on one syllable or the other and giving the vowel of the unstressed syllable a schwa value or at least definitely shortening its time of utterance and lowering its intensity. The prevailing and increasing style in matters of stress is in the direction of reducing the number of words in which the secondary stress, or an even stress, is employed.

The avoidance of a secondary stress sometimes necessitates the change of the vowel values in the unstressed portions of the word; so *dictionary* changes its form from [dɪkʃənerɪ̣] to [dɪkʃənɝ̣rɪ̣] and sometimes even to [dɪkʃənrɪ̣]. The first and third form may be regarded as extremes, for they represent opposing styles. The second form is to be regarded as a compromise, the resultant of the opposition of the first and third forms. So the American who adopts the Britisher's practice of saying [mɪʃənrɪ̣] is following the style that doubtless is too extreme to be adopted. On the other hand, the American who says [mɪʃənerɪ̣] or [mɪʃənɛrɪ̣] is following a local and perhaps provincial style; but the American who says [mɪʃənɝ̣rɪ̣] or [mɪʃənərɪ̣] is adopting a compromise that will be inconspicuous to the ear of the users of either of the extreme styles. It is the inconspicuousness of this compromise that will give it ascendency.

7. TRANSCRIPTION ILLUSTRATIVE OF AMERICAN STYLE

ðə lɔrd ɪz mɑj ʃɛpɝ̣d ɑj ʃæl nɒt wɒnt hi mejkɪ̣θ mi tʊ̣ lɑj dɑwn ɪn grin past͡ʃɝ̣z hi lidɪ̣θ mi bɪ̣sɑjd ðə s͡tɪl wɔtɝ̣z hi rɪ̣s͡torɪ̣θ mɑj sol hi lidɪ̣θ mi ɪn ðə paðz ʌ̣v rɑjt͡ʃəsnɪ̣s fɔr hɪz nejmz sejk jej ðow ɑj wɔk θru ðə vælị əv ðə ʃædọw əv dɛθ ɑj wɪl fɪr now ivḷ fɔr ðɑw ɑrt wɪð mi ðɑj rɒd æ̣nd ðɑj s͡taf ðej kʌmfɝ̣t mi ðɑw prɪ̣pɛrɪ̣s͡t ə tejbḷ bɪfor mi ɪn ðə prɛzṇt͡s əv mɑjn ɛnəmịz ðɑw ənɔjntɪ̣s͡t mɑj hɛd wɪð ɔjl mɑj kʌp rʌnɪ̣θ owvɝ̣ ʃurlị gʊdnɪ̣s æ̣nd mɝsị ʃæl fɒlọw mi ɔl ðə dejz əv mɑj lɑjf ænd ɑj wɪl dwɛl ɪn ðə hɑws əv ðə lɔrd fɔ̣rɛvɝ̣.

SECTION FIVE

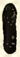
PHONETIC ALPHABETS

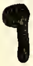
Chapter 18

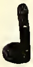
The International Phonetic Alphabet

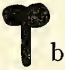
1. THE DEVELOPMENT OF THE I.P.A.

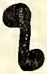
From the very first, students of the English language have been confronted with the necessity of having some set of symbols to represent speech sounds more accurately than does our puzzling and intricate spelling. There have been many such sets of symbols, but the first to gain any great prominence was Alexander Melville Bell's "Visible Speech" symbols. Bell was interested in the teaching of speech to the deaf and in the course of his investigations worked out a set of visible speech symbols which were published in 1867 in his book, *Visible Speech*. This system derived its name from the fact that the symbols were a pictorial representation of the sounds. There were symbols picturing rounded lips, spread lips, a high front tongue position, a high back tongue position, etc. Some of these key symbols picturing vowel positions are listed below:[1]

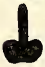
 represents voicing

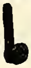
 back of tongue high

 back of tongue low

 back and front of tongue both high

 back and front of tongue both in mid positions

 back and front of tongue both low

 front of tongue low

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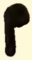
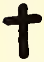
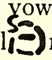
[1] See *The Mechanism of Speech*, Alexander Graham Bell. Funk and Wagnalls Co., N. Y., 1910, p. 65.

 front of tongue high

 rounded lip aperture

By using various combinations of these basic symbols, Bell was able to represent any vowel in any language, as well as a number of theoretical vowels not actually existing anywhere. In a similar fashion, the symbol  represented the sound of *m*. This symbol is a combination of meaning open palate, representing voice and representing closed lips. The incomplete circle pictures the oral cavity.

It was Bell's aim to develop a system of symbols so complete that anyone who could understand them could pronounce correctly at sight any language written in these symbols. He succeeded, but his visible speech alphabet was so revolutionary in form, and contained so many symbols, that few people could understand it. It gradually fell into disuse, because its very completeness made it too cumbersome. Nevertheless, it was widely used for several decades, especially in the teaching of the deaf, and remnants of it may still be seen in the literature.

Among those who adopted Bell's Visible Speech symbols in a modified form was Henry Sweet, an English phonetician. He called his simplified version the Organic or Revised Visible Speech. Sweet realized, however, that even his revised form was too complicated for the average reader. He therefore developed a new set of symbols, using the characters of the Roman alphabet, and called it the Broad Romic system. These symbols were introduced in his *Handbook of Phonetics* published in 1877, and were given in parallel columns with the Visible Speech signs. Since it was these Broad Romic symbols that later formed the basis of the International Phonetic Alphabet, it is in a very real sense that Henry Sweet is called the father of our phonetic alphabet.

The International Phonetic Association was founded in 1886, and in 1888 it adopted more or less bodily Sweet's Broad Romic symbols as the official International Phonetic Alphabet. At its inception the Association was composed largely of teachers of foreign languages and students of linguistics. It was the purpose of this Association to promulgate an official set of symbols that could be used by scholars all over the world in phonetic and linguistic studies, and especially in the teaching of foreign languages. The alphabet has been modified slightly from time to time since its inception, and is now in wide use. *Le Maître Phonétique*, the official publication of the International Phonetic Association, was first issued in 1889. All of its articles are printed in phonetic symbols. Almost every issue contains articles in German, French, and English, as well as several additional languages. It is thus a valuable source not only for information in the field of phonetics but also for the study of foreign languages and of material for practice in the reading of phonetic symbols.

2. ADVANTAGES AND DISADVANTAGES OF THE I.P.A.

The International Phonetic Alphabet has two chief advantages: In the first place, it is the official alphabet of an established body of scholars and thus has behind it the weight of prestige and scholarship. Secondly, it is more widely known than any other system of sound representation except the diacritical markings used in the various dictionaries. It is, as it were, the "Esperanto" of phoneticians—which means that it serves as the best available medium for the exchange of ideas in this professional field.

There are, however, several disadvantages inherent in the International Phonetic system. It was originally promulgated largely by European scholars who were concerned chiefly with the phonetic problems of continental European languages rather than English—particularly our American variety of English. Again, it was inevitable, considering the circumstances of its origin, that in many instances accuracy and consistency would be sacrificed to the interests of conflicting views. The present form of the I.P.A. is not to be thought of as the end product of exhaustive research and profound scholarship. It is rather the result of compromise among conflicting groups of scholars and divergent points of view. Like many compromises achieved under democratic conditions, it represents an acceptable and generally workable solution of the problems presented, rather than a consistent and scientific one. Like most fixed institutions, it is conservative and slow to change in the light of more recent phonetic knowledge. An outstanding illustration of this is the fact that the I.P.A. has never had an official symbol to represent the middle western vowelized *r* sound.

Of course this conservative resistance to change adds to the value of the I.P.A. as a medium for the exchange and permanent recording of ideas in the field of phonetics; but the very characteristic that is an advantage for one purpose is a handicap when it comes to the teaching of phonetics. A rigid adherence to the I.P.A. means that the present day teacher of American phonetics must attempt to present a consistent and accurate view of phonetic science with tools that are the results of compromises made many years ago by scholars who were little interested in many of our special problems. Thus it is not at all surprising that writers of textbooks in the general field of speech, as well as in phonetics proper, have frequently modified the I.P.A. in accordance with their needs and views. On the other hand, in writing for professional publication and in the recording of phonetic studies for future use, there is no adequate substitute for the International Phonetic Alphabet.

3. Other Systems of Symbolization

Phonetic systems are sometimes divided into two main types: acoustic systems and physical systems. Acoustic systems are characterized by their use of the characters of the written alphabet as symbols (augmented, when necessary by other symbols and modifying signs) and by their dependence upon key words to indicate the value of the symbols. The I.P.A. and the diacritical markings used in dictionaries are the chief examples of acoustic systems. Any consistent system of pseudo spelling, such as that used in dialect writings for popular consumption, falls also within this type. Stock examples of the use of pseudo spelling to represent sounds are *ah* for [ɑ] and *aw* for [ɔ]. We should mention again, in this connection, the Dialect Atlas Alphabet. This alphabet is based upon, and to a large extent overlaps, the I.P.A.; but it contains many additional symbols and modifying signs. These are essentially close transcription symbols made necessary by the work of the Dialect Atlas Association in recording and preserving the various dialects of this country. Strictly speaking, only the I.P.A. and the associated Dialect Atlas Alphabet can be said to be phonetic alphabets. All systems use phonetic symbols, that is, signs representing sounds; but some of them do not qualify as phonetic alphabets under our definition of such alphabets as containing one symbol per sound and one sound per symbol.

The second main type of phonetic systems, the physical systems, are characterized by two features: (1) their avoidance of both key words and characters of the written alphabet for symbols, and (2) their use of symbols representing positions and movements rather than acoustic values. The two outstanding examples of this type are Bell's Visible Speech symbols (discussed above) and Jespersen's Analphabetic system.[2]

4. Differences Between the I.P.A Symbols and Those Used in This Volume

The present writers have used certain symbols that are not in strict accordance with the I.P.A. These changes are listed and explained below. Relatively few changes have been made, and most of these are minor modifications for use in narrow transcription. In each case, the change was made because the writers felt either that the older symbolization was inaccurate and inconsistent or that a different symbol was needed to express a different point of view.

(1). *The Use of* [ɝ]. Dr. Kenyon's symbol [ɝ][3] is used here to represent the sound of the General American vowel *r*. There is no symbol for this sound in the I.P.A., although the symbol [ɚ] which was also introduced by Dr. Kenyon at an earlier date is widely used. The decision to use the symbol [ɝ] instead of [ɚ] follows the recommendation made by Dr. Kenyon in the last revision of his *American Pronunciation*. The reasons behind this change are as follows: The generally accepted I.P.A. symbol for the vowel in such words as *bird, heard, fur*, etc., when spoken in standard Southern or Eastern American speech, is [ɜ]. When Dr. Kenyon was originally searching for a symbol to indicate the general American variety of this vowel he decided to add a retroflexing sign to the schwa, thus, [ɚ] and let it represent the "er" sound. The symbol is generally known as the "hooked schwa." Now it is obvious that our general American vowel *r* is by no means a retroflexed schwa, hence the symbol is decidedly misleading. It is much more logical to add the retroflexing sign to the [ɜ], thus [ɝ], since this is at least partially descriptive of the anatomical relationship between the two sounds. Because the new symbol is more logical and consistent than the old one, and because the present writers believe that its use will spread, it is adopted here.

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[2] For a description of this system consult the writings of Jespersen listed in the bibliography.

[3] Actually Dr. Kenyon's symbol shows the "hook" on the bottom stroke of the [ɜ].

(2). *The Use of* [r], [ř] *and* [ᴙ]. Strictly speaking, the symbol [r] represents a trilled *r* in the I.P.A. In accordance with general practice among American phoneticians, [r] is used here to represent in broad transcription any of our American consonantal or glide *r*'s, and [ř] is then used in narrow transcription to indicate the trilled *r*. The other symbols for the close transcription of the *r*'s are standard except the [ᴙ] which the writers have used to help teach the fact that there is a back tongue *r* (which is still not a velar *r*) following back plosives, in the same manner that the front tongue fricative *r* [ɹ] usually follows front plosives.

(3). *The Use of Dots to Indicate Partial Unstressing.* This is not part of the I.P.A. system, but it is used in the Century Dictionary. The writers have adopted it because of the need, even in broad transcription, for a more accurate representation of vowels in unstressed positions than that afforded when the only choice is between some regular vowel symbol and the [ə]. For a more complete discussion of this point, see again the description of the schwa vowels on page 83.

(4). *The Use of* [ʟ] *and* [ᴌ]. It is obvious that we have in English a consonantal or glide *l* and a vowel *l* just as we have a glide *r* and a vowel *r*. Since we have a separate symbol [ɝ] for vowel *r*'s, it seemed logical to add a separate symbol, [ʟ], for vowel *l*'s. The use of the bar to differentiate between front *l* and back *l* in close transcription is of course standard.

(5). *The Use of* [ʟ̣] *and* [ɝ̣]. Conventional I.P.A. representation would write these vowels when they occur in unstressed positions, in words like *little* and *better*, as [l̩] and [r̩]. It is generally said that the bar under these symbols indicates that the sounds, which are ordinarily consonants, have taken on vowel quality and become syllabic. It is just as accurate to say that they are unstressed vowels that have not become schwas. The difference between *l* and *r* in this respect is that the vowel *l* occurs only in unstressed positions in English, whereas the vowel *r* may be either stressed or unstressed. Unfortunately, standard usage countenances the use of the bar to indicate the partial unstressing of only the two vowels [ʟ] and [ɝ], when, in reality, all other vowels show the same phenomenon of unstressing at times to sounds that are not clearly schwas nor yet full vowels. This situation the writers have attempted to remedy by the general use of dots under half unstressed vowels. For the sake of consistency, the dot is used under [ɝ̣] and [ʟ̣] instead of using the I.P.A. symbols [l̩] and [r̩], since that way of indicating the partial unstressing of all other vowels is used.[4]

(6). *The Symbolization of the Glide Sounds*. It will be remembered that the term glide sound has been used here to include both the receding glides (often called diphthongs) and approaching glides. It was pointed out in discussing these sounds (page 110) that the principles involved in the two types of glides are essentially the same. The current symbolization under the I.P.A. system is, however, inconsistent and misleading. The present conventional symbolization of glides to and from the four key vowel positions is as follows:

The four key vowels	[u]	[i]	[ɝ]	[l̩]
Approaching glides to [ɑ]	[wɑ]	[jɑ]	[rɑ]	[lɑ]
Receding glides from [ɑ]	[ɑu] or [ɑʊ] or [aʊ]	[ɑi] or [ɑɪ] or [aɪ]	[ɑr]	[ɑl]

It is to be noted that of the four key vowels, there are distinctly different symbols for [u], [i], and [ɝ], whereas a vowelized *l* is represented by the rather confusing symbol [l̩]. This difficulty is remedied here by using [ʟ] to indicate the continuant vowel and [l] the glide movement. Note also that in the approaching glides, [w], [j], [r], and [l] are used respectively to indicate the indefinite position, whereas in the receding glides the usage is inconsistent. The authors of this text have attempted to clarify this situation by using the same symbols—[w], [j], [r] and [l]—to represent the indefinite terminating positions as well as the indefinite points of origin. The symbols as used in this book would then be as follows:

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[4] The retention of the bar under [m] and [n] to indicate their syllabification is, however, a different matter, since these sounds receive more stress than usual, rather than less, when they form syllables.

The four key vowels	[u]	[i]	[ɝ]	[ʟ]
Approaching glides to [ɑ]	[wɑ]	[jɑ]	[rɑ]	[lɑ]
Receding glides from [ɑ]	[ɑw]	[ɑj]	[ɑr]	[ɑl]

The basis for this change lies in the fact that the writers believe that the sounds [w], [j], [r] and [l] are not accurately described when they are called continuants and a fixed position is designated for them. From their point of view, there is no such thing as a [w], [j], [r], or [l] sound except as the perceptual result of a *movement* from one position to another. Those who may be accustomed to thinking of [w], [j], [r], and [l] as representing sound entities must understand that a new interpretation has been placed upon them in this book. They no longer represent *sounds*, but rather *indefinite positions*—positions that mark the origin or termination of glide movements. The validity of this interpretation is to be judged in the light of available knowledge concerning the nature of these sounds. Granting this validity, the symbolization is consistent and accurate. [w] and [j], when used after a vowel, have merely been made to mean what [r] and [l] already mean when they occur in similar positions—namely, a sign that a glide has terminated somewhere in the region of the positions for the corresponding continuant vowels [u], [i], [ɝ], and [ʟ]. This, then, is consistent with the meaning of all four symbols when they are used preceding a vowel—namely, a sign that a glide has started from a position somewhere in the neighborhood of these same continuant vowels.

It should be remembered that in the narrow transcription of the speech of a given individual, it is quite legitimate to indicate that the glide [ɑj] seemed to end at [ᴊ] or [i] or [ɪ], thus [ɑᴊ], [ɑi] or [ɑɪ]. Or it may be that the glide began at [æ] or [æ̃] or [a] instead of [ɑ], thus [æj], [æ̃j], or [aj]. When the conventional I.P.A. symbolization is used, we are forced to interpret the symbol [ɪ] in one way when it occurs in [bɪt], in another way in [haɪ], and in still another way in [pætɪd]. If, however, we rewrite these words as [bɪt], [haj] and [pætɪ̣d], we know relatively exactly what each symbol represents and are not forced to assume an "understood" difference.

(7). *The Use of* [ᴊ]. If [j] is to represent a certain type of glide movement, then it is evidently inaccurate to use the same symbol to indicate a continuant sound. In the I.P.A. [j] is made to serve in both categories. Since [j] is used in the present work to indicate glide sounds only, it seemed logical to use a small capital [ᴊ] to stand for the continuant fricative made in approximately the same articulatory position.

(8). *The Use of* [hw] *and* [hj]. The writers believe that the sounds represented by these symbols are produced by an *h* approach to approaching *w* and *j* glides, respectively. This is quite different from saying that they symbolize the voiceless counterparts of [w] and [j]. Consequently, the I.P.A. symbols [ʍ] and [ç] are inaccurate, since they represent voiceless continuants (corresponding to the conception of [w] and [j] as voiced continuants). [hw] and [hj] better represent the actual nature of the two sounds.

(9). *The Use of* [t͡ʃ], [ʃ͡t], [t͡s], [s͡t], *etc.* The [͡] is a modifying sign for purposes of close transcription. It is designed to help teach the nature of these combinations and, in certain instances, to avoid ambiguity. It is not so used in the I.P.A.; nor are such combinations as [ʃ͡t] and [s͡t] usually treated as being in the same category as [t͡ʃ] and [t͡s].

(10). *The Use of* [ħ]. This is also a symbol for narrow transcription designed to aid in teaching the difference between an *h* approach with the articulatory mechanism stationary and one when it is in movement.

5. Sample Transcription Illustrating the Differences Just Described

The following transcriptions will serve to illustrate the differences in symbolization enumerated in the preceding pages, the top line of each pair being transcribed in accordance with the symbols used in this book, the second line repeating the same pronunciation of the same material using I.P.A. symbols. Broad transcription is used. The pronunciation is that of the general American dialect.

bɑj nɑjntin fowrtin fɪlmz wɝ
baɪ naɪntin foʊrtin fɪlmz wɝ[5]

ræpɪ̣dlɪ̣ bɪ̣kʌmɪ̣ŋ ej stejpɪ̣
ræpədlɪ bəkʌmɪŋ eɪ steɪpl̩ (or [əl])

nəsɛsɪ̣tɪ̣ lɑjk brɛd ɔr njuzpejpɝ̣z
nəsɛsətɪ laɪk brɛd ɔr nɪuzpeɪpr̩z

djurɪ̣ŋ ðə wɔr jɪrz ðɪ̣ æ̣lɑjz ænd
dɪurɪŋ ðə wɔr jɪrz ði ælaɪz ænd

njutrəl kʌntrɪ̣z əlɑjk wɝ wɛl
nɪutrəl kʌntriz əlaɪk wɝ wɛl

səplɑjd wɪð muvɪ̣z frʌm æ̣mɛrɪ̣kə
səplaɪd wɪð muviz frʌm əmɛrəkə

dʒɝmɪ̣nị əlown kʌt ɔf frʌm ɔl ɛkstɝnɪ̣
dʒɝmənɪ əloʊn kʌt ɔf frʌm ɔl ekstɝnəl

səplɑjz fɑwnd ɪt nɛsɪ̣sɛrɪ̣ tụ stɪmjulejt
səplaɪz fɑʊnd ɪt nɛsəsɛrɪ tʊ stɪmjuleɪt

howm prọdʌkʃən ɪn ɔrdɝ̣ tụ prọvɑjd
hoʊm prodʌkʃən ɪn ɔrdr̩ tʊ provaɪd

sutəbɪ̣ ɛntɝ̣tejnmẹnt ænd prɒpəgændə
sutəbəl ɛntr̩teɪnmənt ænd prɒpəgændə

fɔr hɝ̣ sɪ̣vɪljən pɒpjụlejʃən
fɔr hr̩ sɪvɪljən pɒpjuleɪʃən

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[5] The symbols [ɝ] and [r] are used, perforce, in the manner generally accepted among American phoneticians rather than in strict accordance with the I.P.A.

6. LEARNING THE I.P.A.

The student who has mastered the symbols used in this book will find it a very simple matter to transcribe material according to the I.P.A. He should at this time learn to do this, either on his own initiative or in connection with assignments made by his instructor. It is usually advisable to transcribe in accordance with the I.P.A. when writing for publication in professional journals. The following injunctions will serve to summarize the necessary changes in symbolization when writing in the I.P.A. symbols:

(1). Use [ɚ] instead of [ɝ].
(2). Use [r] instead of [Я].
(3). Omit dots under all sounds.
(4). Use [l̩] and [ɫ̩] instead of [ʟ̣] and [ᴌ̣].
(5). Use [r̩] instead of [ɝ̣].
(6). Use [ɑʊ] or [aʊ] instead of [ɑw] or [aw] and [oʊ] instead of [ow].
(7). Use [aɪ] instead of [aj] or [ɑj] and [ɔɪ] instead of [ɔj] and [eɪ] instead of [ej].
(8). Use [j] instead of [ᴊ].
(9). Use [ʍ] instead of [hw] and [ç] instead of [hj].
(10). Omit ligatures over [t͡ʃ] [t͡s] etc.
(11). Use [h] instead of [ħ].

Chapter 19

Diacritical Markings

1. The Use of the Pronouncing Dictionary

When one desires to learn what pronunciation of a given word is in best standing in a given area, he must have recourse to a word list that has been prepared by observers situated at strategic points over the area in question, who indicate, with diacritical markings or phonetic symbols or both, the pronunciation for each word as they have heard the "best speakers" utter it. The reliability of such a word list depends of course upon the number of these observers, their ability to record what they hear, and their discrimination in selecting their exemplars. The reliability of the information to be gleaned from reading such a list depends upon the reader's ability to understand the diacritical markings and phonetic symbols, as well as upon the faithfulness and completeness of the phonographic system employed by the compilers of the list.

Two impediments often stand between the observers and the readers: (1) The key words given to illustrate a phonogram have such variant pronunciations as to be misleading to some readers. The establishing of a table of standard sounds of reference is difficult. (2) The reader of the pronouncing dictionary is usually too easily satisfied with noting the "correct" pronunciation. He does not notice variant pronunciations, nor does he concern himself with a careful study of the author's explanation of the phonographic system used in indicating this "correct" pronunciation. The reader too often reads into a given phonogram something quite different from what the author intended. A third possible impediment is that the publishers of dictionaries are sometimes obliged for commercial reasons to treat vaguely the pronunciations of words upon which regions differ so markedly as to make for interregional prejudices. Would it be good business, for example, for a dictionary to settle the question as to whether *hard* is [hɑrd], [hɑəd] or [hɑːd]?

In spite of these limitations, the pronouncing dictionary has its legitimate uses. Few agencies have the resources at their disposal to make so complete an inventory of the speech styles of the country as do the compilers of an unabridged dictionary. To ignore their research in this field, and to substitute for it the personal opinions of individuals is of doubtful advantage.

In using the dictionary as a guide to speech uses, one should remember that the dictionary gives the pronunciations that have good standing the country over. One should honor these pronunciations, therefore, in every instance, and deviate from them only when the form given is conspicuously different from that of his community. The person whose speech community is the entire nation would do well to follow the dictionary without deviation from its recommended forms.

The books selected by the writers as American authorities are the following: Funk & Wagnalls, *New Standard Dictionary of the English Language*, 1925; *The Century Dictionary and Cyclopedia*, 1913; *Webster's New International Dictionary*, 2nd Edition, 1937.

2. A COMPARISON OF FIVE SYSTEMS OF SYMBOLIZATION

To assist the student in translating the phonographic system of the dictionary into that employed in this book the following tables are given:

TABLE I. CONSONANTS AND CRESCENDO GLIDES

Key Words	*Phonetic Symbols*	*Webster Symbols*	*Funk & Wagnalls Symbols*	*Century Symbols*	*I.P.A. Symbols*
1. *p*in	[p]	p	p	p	[p]
2. *b*oat	[b]	b	b	b	[b]
3. *m*an	[m]	m	m	m	[m]
4. *f*an	[f]	f	f	f	[f]
5. *v*at	[v]	v	v	v	[v]
6. *t*o	[t]	t	t	t	[t]
7. *d*o	[d]	d	d	d	[d]
8. *n*o	[n]	n	n	n	[n]
9. *s*ay	[s]	s	s	s	[s]

Key Words	*Phonetic Symbols*	*Webster Symbols*	*Funk & Wagnalls Symbols*	*Century Symbols*	*I.P.A. Symbols*
10. *z*ero	[z]	z	z	z	[z]
11. *s*ugar	[ʃ]	sh	s͡h	sh	[ʃ]
12. mea*s*ure	[ʒ]	zh	ʒ	zh	[ʒ]
13. *th*in	[θ]	th	t͡h	th	[θ]
14. *th*ose	[ð]	ŧh	ŧh	ŦH	[ð]
15. *ch*ose	[t͡ʃ][1]	ch	c͡h	ch	[tʃ]
16. *j*oy	[d͡ʒ][1]	j	j	j	[dʒ]
17. *k*ing	[k]	k	k	k	[k]
18. *g*o	[g]	g	g	g	[g]
19. si*ng*	[ŋ]	ng ŋ	ŋ	ng	[ŋ]
20. *h*ot	[h]	h	h	h	[h]
21. *r*un	[r]	r	r	r	[r]
22. *l*ady	[l]	l	l	l	[l]
23. *w*in	[w]	w	w	w	[w]
24. *y*ou	[j]	y	y	y	[j][2]
25. *h*uge	[ħ]	h	h	h	[h]

Table II. Vowels and Diminuendo Glides

Key Words	*Phonetic Symbols*	*Webster Symbols*	*Funk & Wagnalls Symbols*	*Century Symbols*	*I.P.A. Symbols*
1. s*ee*	[i]	ē	ī	ē	[i]
2. rec*e*de, cit*y*[3]	[ị]	ē̇	none	ē	[i]

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[1] Other combinations of this sort could be included here, such as [t͡s] in *cats* and *hence*, [s͡t] in *stand* and *paste*, [z͡d] as in *bruised* and *hazed*, [ʃ͡t] as in *washed* and *dished*, and [ʒ͡d] as in *rouged*. The two listed above were chosen merely because of convention.

[2] This should be distinguished in I.P.A. from the [ɪ]. *Dew* is [dɪu], but *you* is [ju]. [j] is used only at the beginning of a syllable.

[3] The final sound in *city*, as spoken in most of the "general American" area, is a good example of the sound [ị]. In England and in many parts of eastern United States *city* is pronounced [sɪtɪ̣].

Key Words	*Phonetic Symbols*	*Webster Symbols*	*Funk & Wagnalls Symbols*	*Century Symbols*	*I.P.A. Symbols*
3. s*i*t	[ɪ]	ĭ	i	i	[ɪ]
4. Apr*i*l	[ɪ̣]	*ĭ*	ɪ	ị	[ɪ]
5. s*ay*	[ej]	ā	ē	ā	[eɪ]
6. ch*a*os	[e]	ā̇	none	ạ̄	[e]
7. s*e*t	[ɛ]	ĕ	e	e	[ɛ]
8. mom*e*nt	[ɛ̣]	*ĕ*	none	ẹ	[ɛ]
9. s*a*t	[æ]	ă	a	a	[æ]
10. *a*ccount	[æ̣]	*ă*	none	ạ	[æ]
11. h*a*lf	[a]	ȧ	ɛɪ	ȧ	[a]
12. tr*a*nslate	[ạ]	none	none	ạ	[a]
13. c*a*lm, f*a*r	[ɑ]	ä	ɑ̄	ä	[ɑ]
14. *a*rtistic	[ɑ̣]	none	ɑ	ạ̈	[ɑ]
15. f*o*x, sw*a*p	[ɒ]	ŏ	ɵ	o	[ɒ]
16. c*o*nnect	[ɒ̣]	*ŏ*	none	ọ	[ɒ]
17. s*o*rt, *a*ll	[ɔ]	ô	ɵ̄	ô	[ɔ]
18. f*o*rget	[ɔ̣]	none	none	ộ	[ɔ]
19. n*o*	[ow]	ō	ō	ō	[oʊ]
20. *o*bey	[o]	ō̇	o	ọ̄	[o]
21. c*ou*ld	[ʊ]	o͝o	u	u	[ʊ]
22. f*u*lfill	[ʊ̣]	none	none	ụ	[ʊ]
23. b*oo*t	[u]	o͞o	ū	ö	[u]
24. rh*eu*matic	[ụ]	none	none	ọ̈	[u]
25. c*u*t	[ʌ]	ŭ	ᴜ	u	[ʌ]
26. circ*u*s	[ʌ̣]	*ŭ*	none	ụ	[ʌ]
27. b*ir*d (Eastern)	[ɜ]	û	ᴜ̄	ė	[ɜ]
28. p*er*fuse (Eastern)	[ɜ̣]	ẽ	none	ẹ̇	[ɜ]
29. b*ir*d (Mid-Western]	[ɝ]	û	ᴜ̄	ė	[ɚ][4]

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[4] Strictly, ɚ is not an I.P.A. symbol, being merely an American invention to represent a sound important here, but not in most other parts of the English speaking world.

Key Words	*Phonetic Symbols*	*Webster Symbols*	*Funk & Wagnalls Symbols*	*Century Symbols*	*I.P.A. Symbols*
30. p*er*fuse (Mid-Western)	[ɝ̣]	ẽ	none	ẹ̇	[r̩]
31. bott*l*e	[ʟ̣]	l	l	l	[l̩]
32. sof*a*	[ə]	*ȧ*	ə	ụ	[ə]
33. t*i*me	[ɑj]	ī	ɑi	ī	[aɪ]
34. s*ou*nd	[ɑw]	ou	ɑu	ou	[aʊ]
35. b*oi*l	[ɔj]	ɵi	ɵi	oi	[ɔɪ]

3. SPECIAL NOTES ON THE WEBSTER SYSTEM

It will be noted that the phonetic symbolization generally used in this book and the diacritical system of Webster do not meet squarely at all points. Some sounds that Webster discriminates are not listed in our charts of phonetic symbols; and certain sounds listed in the phonetic charts are not represented in Webster's system.

Webster divides the [ɒ] phoneme into two families of *o*'s, marked ŏ and ŏ̂, and differentiates in this way the vowels in the words *cloth* and *odd*. Other words he marks ŏ are *forest, torrid,* and *not*; and others he marks ŏ̂ are *soft, dog, loss,* and *cost*. The pronunciation of the vowels of these words is so variable from region to region that it seems hardly practicable to follow this microscopic division in our phonetic symbolization.

In spite of the fact that Webster does not list as speech elements such obvious combination consonants as *ts, dz, sht,* etc. he does list the following combinations: *gz* as in *exist, hw* as in *white, ks* as in *box,* and *kw* as in *queer*. In our phonetic representation these combinations are not listed as such, but are made up as needed by combining symbols given to represent the separate units.

The system used in Webster makes no distinctions between [l] and [ʟ], [h] and [ħ], [ɝ] and [ɜ], and between and among the various glide *r*'s. The system of Webster provides (as many systems do not) for the symbolization of the unstressed vowels [æ̣], [ị], [ɛ̣], [ɝ̣], [ɪ̣], [ɒ̣], and [ʌ̣], but does not provide for the unstressed vowels [ạ], [ɔ̣], [ʊ̣], [ụ], [ɑ̣].

Webster provides alternative representation for the combination

[ju]; the single symbol ū may be used, or the sound may be broken up into its elements and written yo͞o. The choice apparently depends not upon the sound of the word to be pronounced, but upon its spelling, so *youth* is marked yo͞oth, and *use* is marked ūz. Webster provides even an unstressed form for the phonetic combination [ju], his representation being ū̇, as in *unite*.

Webster also recognizes as a single sound unit [ɛr] represented in the dictionary as â. It is not clear (perhaps the authors of the dictionary were not anxious to make it so) whether this sign, â, is intended to represents only the [ɛ], as heard in *care*, *bear*, *mare*, or represents also the *r*. At least the only examples of this given by Webster are those in which the vowel is followed by the *r*. [ɪr] is treated similarly by Webster, being given a separate symbol ȩ̄ to represent the vowel in such words as *bier*, *dear*, *fear*.

4. SPECIAL NOTE ON THE FUNK AND WAGNALLS SYSTEM

Like Webster, Funk and Wagnalls treat [ju] as a separate sound unit and give it in both the stressed form, as in *feud*, *tube*, and *pupil*, and the unstressed form, as in *duration* and *futility*. The stressed forms they represent as iū, the unstressed form as iu. This system makes no distinctions between [l] and [ʟ], [h] and [ħ], [ɝ̣] and [ɜ] and between and among the various glide *r*'s. It provides for only four unstressed vowels, [ɑ̣], [ọ], [ə], and [ɪ̣]. The vowels [ị], [ɛ̣], [æ̣], [ạ], [ɒ̣], [ɔ̣], [ʊ̣], [ụ] [ʌ̣], [ɜ̣], and [ɝ̣] are each represented by the same symbol as the stressed form or by one of the four symbols for unstressed vowels: ɑ [ɑ̣], o [ọ], ə [ə], ɪ [ɪ̣].

Like Webster, Funk and Wagnalls give us a separate symbol for [ɛ] followed by an *r*, as in the words *air*, *fare*, *pear*, etc. Their symbol is ā, They make no distinction between the [ej] and [e], both usually being represented by their symbol ē.

5. SPECIAL NOTE ON THE CENTURY SYMBOLS

The Century system of phonograms makes no distinctions between [l] and [L], [h] and [ħ], [ɝ] and [ɜ], and between and among the various glide *r*'s. This system provides for a complete set of unstressed vowels. An explanatory note in the introduction to the dictionary states:

"A single dot under a vowel in an unaccented syllable indicates its abbreviation and lightening, without absolute loss of its distinctive quality. A double dot under a vowel in an unaccented syllable indicates that, even in the mouths of the best speakers, its sound is variable to, and in ordinary utterance, actually becomes, the short u-sound (of *but*, *pun*, etc.)." Thus a vowel marked with two dots below it would be the equivalent of the sound [ə].

Like the other two dictionaries, the Century employs a special symbol, ã, to represent the vowel combined with *r* in glides such as those in *fare*, *hair*, *bear*.

Like the other dictionaries, also, the Century gives a special representation for the combination [ju] as in *mute*, *acute*, *few*. In the Century system these are marked ū. In words like *duration* and *unite* this vowel is marked ụ̄ to indicate the unstressing.

Another interesting device of this system is the use of the ⌣ beneath a *t*, *d*, *s*, or *z*. t̮ varies between [t] and [t͡ʃ], as in *nature*. d̮ varies between [d] and [d͡ʒ], as in *verdure*. s̮ varies between [s] and [ʃ], as in *issue*. z̮ varies between [z] and [ʒ], as in *seizure*.

SECTION SIX

APPLIED PHONETICS

Chapter 20

Speech for the Deaf

1. THE PROBLEM

An important application of phonetics is in the teaching of speech to those who are deaf. If one is unable to hear the speech of his associates, he cannot follow acoustic models in learning it. He must perforce learn to produce his speech sounds by learning to imitate the positions and movements of the speech organs, letting his mentor check, by hearing, the accuracy of the articulatory and phonatory adjustments. The problem is markedly different from that of learning speech by ear. When the hearing person learns speech, he usually is quite unaware of what movements he makes to produce the various sounds of speech; but when the deaf person learns it he must become aware of every movement necessary for each sound. The hearing person may be as unconscious of the movements of speech as of those of swallowing; he learns by focussing his attention upon the acoustic end-result of his movements. The deaf person, however, must focus his attention upon the movements themselves. In order that he may produce the proper acoustic effect, his teacher must be able to show him definitely all the necessary adjustments of the speech organs. This ability on the part of the teacher is based upon a minute and accurate knowledge of kinesiologic phonetics.

2. GENERAL PROCEDURES

The procedure in teaching the deaf child to speak begins with teaching him to produce at will a stream of tone of suitable pitch, intensity, and quality. Since he lacks hearing he must rely, for the control of what he is doing with his voice box, upon the kinesthetic and cutaneous sensory equipment of the throat. To supplement these sensory controls many mechanical and electrical aids have been found useful. Any means that will make the pupil-patient's vocal tone palpable or visible to him may be employed. He must be able, not only to produce an effective vocal tone, but also to start it and stop it precisely, so as to meet the requirements of continuous speech, in which voiced and unvoiced sounds follow each other in rapid succession.

The next step is training the control of the muscles that open and close the nasopharyngeal port—the muscles of the velum and the superior constrictors of the pharynx. These muscles must come under direct, voluntary, conscious control, a type of adjustment that is usually wanting in the hearing person, whose control, though voluntary, is unconscious and indirect. The deaf child must learn by feeling to be aware of the positions of the velum, and in that learning process mechanical and electrical aids are often successfully employed to make the movements of the velum and the pharyngeal wall palpable and visible. These aids for the control of the nasopharyngeal sphincter must take the place of the acoustic effects by which the hearing child accomplishes the same results.

After the control of this sphincter has been achieved, the child is ready for lessons in articulation and enunciation. The first lessons should concern themselves with labial and front-tongue sounds, the movements for which the child can see made. After these have been learned, the sounds that are not visible should be developed. With these sounds, again, visual aids through mechanical and electrical means are employed, so that the child may guide by sight what he is unable to guide by hearing.

One of the most difficult problems in teaching speech to the deaf, and a problem usually attacked last, is that of inflections. The deaf child may have good voice, accurate control of nasalization, clear-cut consonants, and well placed vowels, and his speech may still seem uncouth and mechanical, because of his lack of inflection or his use of non-standard inflections. For the person who is completely deaf the problem of developing normal inflections is insoluble, though some improvement may be expected from assiduous training and industrious practice. In developing these inflections the pupil must learn the "feel" of the muscles of the throat that is associated with the rise and fall of pitch and force. Again, the teacher may aid the learner not only by reporting to him when the inflection seems to the teacher's ears to be satisfactory, but also by showing him instrumentally[1] a picture of the rise and fall of the pupil's inflections.

No matter how intelligent the deaf person is, nor how well trained, he will need frequent periods of retraining. Such is the tendency for his speech to relapse because of his inability to check it and compare it with the speech of others, that, at least during the first twenty years of his life, he will need the aid of the speech teacher trained in phonetics.

3. SPEECH READING

The deaf are in need of the trained phonetician not only to help in learning the *production* of good speech, but also to aid in learning the *perception* of speech. Those who are only partially deficient in hearing and those who lost their hearing in childhood, as well as those who have been deaf from birth, are in need of aid in the perception of speech.

The first method of increasing the ability of these hearing-defectives to comprehend speech is lip reading, or, as it is more properly called, speech reading. The pupil is taught to recognize the sounds of speech by noting the accompanying movements of the visible organs of articulation. If he were able to see all the movements involved in articulation and phonation, he would have a means of perceiving all the sounds of speech, but, seeing only the lips, jaw, and tongue-tip, he gets only a fragmentary picture of what is said—the rest he must supply by inference. It becomes important, therefore, that the fragment that he can see is observed accurately.

Many sounds which are dissimilar acoustically are similar in the visible picture they present. The pupil must learn to group these similar sounds into sharply differentiated classes. All the members of a given class are called *homophenes*. The hearing person is occasionally confused by *homophones* such as *to*, *two*, *too*. Words with such similar sounds are rare in our language, hence the confusion resulting from homophones is negligible. But there are many homophenes, and hence the possibility of confusion is thus correspondingly greater in speech-reading than in speech-hearing. Since the speech reader cannot see the back of the tongue, the velum, and the larynx, such words as *bend*, *bent*, *bed*, *bet*, *meant*, *mend*, *pen*, *pet*, *penned*, etc., look alike to him. To this list might also be added other words that have such similar visible movements that the differences can be observed only by the most skillful reader, and then only when the speaker's face is in the best of light: viz., *bait*, *bayed*, *made*, *main*, *mate*, *paid*, *pave*, *paint*, *pained*, etc. *Pate* and *men*, to the hearing person seem radically dissimilar, but they are closely homophenous.

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[1] References have been made in this section to the use of instruments for teaching speech to the deaf. The scope of this text does not permit a technical discussion of these instruments and their uses. We can pause only to name them and specify their functions in teaching: Manometric flame, for training of vocalization, and for rendering inflections visible to the pupil; tonoscope, for teaching the proper pitch, and for teaching pitch inflections; oscilloscope, for teaching vocalization and the control of inflections of pitch and force. In addition to these instruments there are many simpler devices for teaching the control of nasalization.

Another problem of speech reading is to distinguish the incidental and transition movements from the movements that are the direct accompaniments of standard speech sounds. For example: *too well* and *to hell* are homophenous, because the speech reader cannot tell the difference between two factors: (1) an incidental movement of the articulators while they are moving from the position [u] in *to* to that of [ɛ] in *hell*, and (2) the directly significant movement involved in the [w] of *well*. In one phrase the movement is to be ignored as only an incident of the transition from one sound to another; while in the other phrase it is a meaning-carrying adjustment of the articulators.

He who would guide the student of lip-reading must, therefore, have a detailed knowledge of kinesiologic phonetics.

The second method of aiding the person who is defective in hearing to attain greater efficiency in the perception of speech is the fitting of a hearing-aid.

4. HEARING AIDS

In order to hear as well as the normal person, the person who has a general loss of auditory acuity needs merely to have the sounds of speech amplified for him. If he could always place himself nearer to the speaker than the other auditors,[2] or if he could persuade speakers always to talk to him as though he were much farther away than he actually is,[3] he would not need a hearing aid. But the problem of fitting him with a hearing aid is not a difficult one. All he needs is an amplification of the sounds of speech. Formerly this amplification was accomplished merely by capturing a larger amount of sound by means of an ear-trumpet. A more modern means is by an electrical instrument which is sensitive to sound waves. The problem of fitting the hard-of-hearing person with such a hearing aid is merely that of taking care that all of the sounds of speech are about equally amplified. If some of the sounds are more amplified than others the stronger sounds will mask the weaker, so that the person so fitted will not be able to understand speech any better with the aid than without it; he will merely be able to hear it farther.

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[2] This is virtually what a good hearing aid does. Just as a pair of binoculars makes one who is sitting in the gallery of the theatre seem to be sitting in the orchestra circle, so the hearing aid brings the auditor closer to the speaker by making the sound waves as intense as they would be if he were actually to step forward while the speaker keeps his volume unchanged.

With those whose hard-of-hearing condition is not that of a simple reduction of acuity, but rather of a disparity of acuities, some frequencies being heard with normal or even super-normal acuity and others being heard with reduced acuity, the problem of fitting the hearing aid is much more complex. We may explain the difficulty here by an analogue from the realm of vision. Some children who are deficient in vision need only to have their work more brightly illuminated, while others need corrective lenses. The former are analogous to the hard-of-hearing who need only amplification of all speech sounds; the latter are analogous to those who need hearing aids that re-balance the relative intensities of the sounds of speech. This re-balancing requires the building of a hearing aid with selective amplification.

In the prescription for the hearing aid one must first secure a chart of the patient's hearing showing which frequencies he hears normally and those in which he is deficient. With this chart one who knows what frequencies are involved in each of the sounds of speech can learn which sounds the hard-of-hearing person is unable to hear, which ones he can hear with difficulty, and which he can hear normally. The problem then is to construct an aid that will compensate for the losses without making the other sounds of speech intolerably loud. For such a hard-of-hearing person an "honest amplifier"—one that would admirably suit the person who has a general reduction of acuity—might be useless, since, even if it amplified the sounds that he cannot hear, it would also amplify the sounds that he can hear, to a point at which they would mask all others. The proper fitting of a hearing aid is therefore a very technical phonetic problem.

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[3] This is virtually what any hearing aid does, good or bad, if the instrument is conspicuous enough. If the hard-of-hearing person wears a plainly visible instrument, the speaker is constantly reminded that he must speak more loudly and carefully. Hence many audicles that are acoustically useless serve the purpose of making it easier for the wearer to hear conversation.

Chapter 21

The Phonetics of Foreign Accent

1. An Approach to the Problem

Two applications of English phonetics concern themselves with foreign languages: (1) The elimination of foreign accent from the English speech of those who were reared under the influence of a foreign language, and (2) the simulation of a foreign accent for dramatic purposes. These two applications involve much the same phonetic principles—in both cases an analysis must be made of the phonetic differences between English and the particular foreign language in question. This analysis concerns itself with the following considerations: (1) The consonants (nasals, fricatives, plosives, affricates, and sibilants) of English that are wanting in the foreign language, (2) the consonants of the foreign language that are wanting in English, (3) the consonants that are common to the two languages, (4) the consonants of the foreign language that are the nearest substitutes for the sounds peculiar to English, (5) the consonants that are represented by the same letter in the two languages and those that are represented by different letters, (6) the inflection-patterns and habits of vocal attack and release of the foreign language, and (7) the overlapping of the vowel systems of the two languages, i.e., which vowel phonemes are exactly coincident, which ones are similar but narrower in one language than the other, and which phonemes of one language include parts of two or more phonemes of the other.

2. A Sample Analysis of English and German

Let us take the German as an example (but *merely* as an example) for such an analysis, remembering that this study of the language must be made, not *in vacuo*—in terms of the German grammar book—but in a working situation, in terms of the actual speech of one or more German-speaking persons. If one is to produce an imitation of the German dialect that sounds authentic, he must know the German phoneme system of a particular dialect. Suppose a German were to imitate American attempts to talk his language and were to incorporate into his American speech some southernisms, some eastern American tricks, and some mid-western speech forms, the result would be an unconvincing burlesque of American speech. Thus in dramatic and interpretative work the dialect must be based upon the speech of actual Germans, preferably those whose brand of German is typical. On the other hand, if one wishes to help a German speak English acceptably, he must know the sound system of that particular German, not that of the typical German, nor of Germans in general. The following analysis is made on the basis of the speech of a person whose native dialect is that of the cultured resident of Berlin.

1. The consonants [θ] and [ð] of English are lacking in German.

2. The consonants [χ] and [ç] are lacking in English and usually also [d̪] and [t̪].

3. All other consonants of the two languages are common to both. It should be noted that German and English emphasize different combinations of consonants. The combination [ʃt], for example, is rare in English and common in German, but the opposite is true of [tʃ]. The sound [ʒ] appears in German only as an importation from other languages, but the same is true in English, except that there are more such importations. The importation of [dʒ] is very rare in German. It is a common sound in English, being a modification of the [ʒ] importation from French and also an Anglicization of the [j] sounds of continental languages.

4. The dental *d* [d̪] and the dental *t* [t̪] are the nearest substitutes in German for the English [ð] and [θ].

5. As to representation of sound by letters one can cite only the outstanding differences between the two languages, such as the following:

Letter	*German Sound*	*English Sound*
J	[j]	[dʒ]
s	[z]	[s]
v	[f]	[v]
w	[v]	[w]
z	[t͡s]	[z]

6. The inflection pattern of German is less smoothly modulated than that of English and changes are more abrupt. One of the characteristic vocal habits of the language is, in all cases in which a word begins with a stressed vowel, to introduce the vowel with an [ʔ], and to unvoice the final sounds of all words[1] except those ending in vowels, vowel glides, or nasal sounds. This habit gives to German speech, as heard by the American, a clipped, explosive effect.

7. To illustrate the overlapping of vowels we need only mention the outstanding differences in phonemes between German and English. The vowels [i], [ɪ], [ɛ], [ɑ], [u], [ʊ], [ʟ], [ə], are about the same in German as in English. German employs the pure, undiphthongized [o] and [e] more than does English. German has an approximation of [ej] in its "long, umlaut *a*." German also has a complete set of true umlauts, represented phonetically as [y], [ø], and [œ]. German lacks the English vowels [æ], [a], [ʌ], [ɒ], [ɔ], [ɜ], [ɝ]; and since these vowels are lacking, adjacent phonemes are likely to be much broader than the corresponding phonemes of English. For example, since there are no German phonemes near [ɑ], this sound may in various speakers become [ʌ], [ɒ], or [a]. German has no approaching or crescendo *w*-glide.

Now, what will the German-reared person be likely to do with English? 1. He will substitute some German sounds for [ð] and [θ]—usually [d̪] and [t̪], but sometimes [z] and [s].

2. Words like *book* and *milk*, that have close German cognates in the final consonant—English using [k] and [c], German using [χ] and [ç]—will be pronounced with a fricative termination rather than the English plosive ending.

3. Most consonants will be standard English sounds.

4. The English *d*'s and *t*'s will be dentalized, so that *pet* will be [pɛt̪], and *tip* will be [t̪ɪp].

5. Common words, especially those similar in spelling to German words of the same meaning, will be pronounced with German values

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[1] This habit of unvoicing the final sounds is so universal that German school children are taught to spell using plurals and other inflected forms so that they may know whether the root form ends in a surd or a sonant. Thus the child is first asked to spell *Hunden*, not *Hund*, because in *Hunden*, the *d* not being final is voiced, whereas in the singular form, *Hund*, it is indistinguishable from a *t*. So, if a child spells the word as *Hunt*, his attention is called to the plural form.

given to the letters, such as *J*esus [jesʊ̣s], *s*o [zo], *v*ery [fɛᴙị], *w*ill [vɪl], *z*ero [tsɪᴙọ].

6. The phrasing will be explosive, and voicing will begin and end abruptly. Words like *eyes*, *awes*, *of*, and *above*, will be [ˀɑjs], [ˀɔs], [ˀɑf], and [əbɑf].

7. Words such as *pane* and *bone* are likely to be pronounced [pen] and [bon]. Umlauts may often be substituted for [ɝ], [ɜ], and sometimes for [ʌ], in such words as *bird*, *girl*, *mud*. When [w] as in *window* is mispronounced, it will usually be uttered as [v].

In the correction of any foreign accent or in the development in English speech of a foreign dialect it is usually possible to find accidental sounds that will closely approximate the sound desired. For example, to take German again, suppose one is trying to develop the dental *d*, [d̪]. Let him take some combination like *with Dot*. As the words are spoken rapidly blending one with the other in articulation, the phrase becomes easily [wɪð͡dɒt]. Then the [wɪð] can be deleted, and a good German *d* remains as an initial consonant. Or, to take an opposite case, suppose we are attempting to correct a German undiphthongized *o* as in *don't*, pronounced by the German [d̪ont̪]. Let him pronounce the German words *wo und wann*, assimilating these words into one vocable. Then let him leave off the *nd wann*, leaving something close to [vow]. Or, again, if the problem is to teach him the approaching w-glide, let him take the German phrase *du isst* and, after assimilating them, delete the *d*, leaving [wɪst].

In this manner[2] any language may be studied, making phonetic comparisons with English.

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[2] It should be said here that the foregoing is but an example of an analysis for the specific purposes mentioned above and is not to be thought of as a final and thorough-going phonetic study of German in all its varying dialects. Even as such an example, it is intended to illustrate the *manner* of the analysis, not the *facts* to be found.

Chapter 22

The Use of Phonetics in Speech Correction

1. PHONETICS, THE CLINICIAN AND THE PATIENT

A thorough knowledge of phonetics is almost indispensable to the clinician who would diagnose and treat defects of speech. Without it his work is narrowed in scope and effectiveness, if not at times actually ill-advised. The science of phonetics has its most immediate application to the general type of speech defects called *dyslalias*—the articulatory defects. Such defects may arise from varied causes and they may show quite different speech pictures; but they are all characterized by defective use or utterance of some of the sounds of speech.

From the standpoint of the speech symptom, there are four main types of articulatory defects: (1) Sound omissions—certain sounds may be omitted, either because of negligence in articulation or because the speaker is unable to produce them, as in [fɪŋɝ̣] for [fɪŋgɝ̣] in infantile speech. (2) Sound substitutions—the replacing of one standard speech sound by another, as in infantile speech [mʌvɝ̣] for [mʌðɝ̣]. (3) Defectively produced sounds—sounds that resemble the intended sound, but which are not standard in their manner of production or in their accoustic nature, as a lateral *s*. (4) Sounds that are ill-fitted to the moving stream of speech, i.e., slurred sounds, unusual linking sounds, over-precise or staccato speech sounds, etc. It is obvious that a complete understanding of any of these types is dependent upon a thorough knowledge of phonetics.

Since these articulatory defects make up from fifty to seventy-five percent of the cases usually dealt with in the speech clinic, there can be little question as to the value of phonetic training to the speech clinician. He must be familiar with the mechanism for speech and with the acoustic nature, method of production, and interrelationships of the various sounds of speech—in fact, with most of the body of phonetic knowledge. Lacking such knowledge, his understanding of the case before him will often be superficial, and the same lack of insight may show itself in his course of treatment.

The question as to the value of phonetic knowledge to the speech defective himself is less easily settled. When this question is raised, most people think only in terms of whether or not the clinic patient should be taught the phonetic symbols. As we shall see later, the answer depends upon individual circumstances. The teaching of symbols, however, is only a small part of the field of phonetics. On closer examination of the problem, we find that the treatment of almost any articulatory case involves the teaching of phonetics more or less intensively—regardless of whether or not the symbols as such are taught. It is usually necessary to show the subject that certain of his sounds are defective, to tell him why and how they are defective, to teach him the correct sounds by one method or another, and to show him when these sounds should be used in speech. All of this amounts to teaching phonetics on a small scale. It may be quite inaccurate teaching and, if the clinician is not versed in the field, the results may be unfavorable; but it is, none the less, an attempt to teach the patient something about speech sounds.

Consciously or unconsciously, we follow the practice of teaching the patient as much phonetics as we think he needs to know in order to overcome his defect. How much this will be depends upon the nature and cause of the defect, the age of the patient, his previous training and many other factors. We need to remember, however, that speech correction differs from the normal process of acquiring speech in that the latter involves essentially the formation of new habit patterns, whereas speech correction inevitably means the breaking down of incorrect habits already formed and the formation of new, correct habits. This difference is sometimes expressed by the phrases "education versus reeducation" and "training versus retraining."[1] The significance of this difference lies in the fact that, whereas the normal acquisition of speech may take place without much conscious effort and without much attention to details, the reeducative process requires a conscious attention to specific details of the old habits that are to be broken down and the new ones to be formed. Since the habits here involved are those concerned with the production of speech sounds, this means that the very nature of the speech correction process makes it necessary to teach the patient phonetics.

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[1] See West, Kennedy, and Carr, *The Rehabilitation of Speech.* Harper and Brothers. (New York, 1937) p. 36.

While the conclusion seems inescapable that the correction of an articulatory defect will always involve the teaching of a considerable amount of phonetics, it is less certain that it will always be necessary to teach the patient the phonetic symbols. We need to recall at this point the nature and purpose of these symbols: They are tools in the study of phonetics, and as such, they are convenient, efficient, and time-saving. From this standpoint we can say that the patient should be taught the phonetic symbols whenever their value as tools in the administration of therapy will justify their use. Teaching the patient symbols for sounds does not, of course, correct his defect. Such teaching can become mere busy-work yielding no profit in increased progress by the patient. Oftentimes however, progress can be speeded up materially once the symbols are learned, since they provide the means for an interchange of ideas between clinician and patient. Anyone who has tried to correct the articulatory defects of a clinic patient who knows the phonetic symbols can testify to the saving of time and the increase in effectiveness of teaching.

Obviously, the decision as to whether or not the patient is to be taught the symbols must be made on the basis of the best judgment of the clinician as he surveys the possibilities of the case. In general, adults with average or better intelligence, whose articulatory problems are wide-spread and deep-seated, will profit by learning the phonetic symbols. Oftentimes it will prove advantageous to teach only the symbols for those sounds that give difficulty. Another factor to be considered is the length of time that the patient will probably receive training. Other things being equal, the longer the period of training the more profitable it will be to teach the phonetic symbols. A knowledge of symbols is of special value to foreign dialect cases with their multiple problems and their constant confusion of foreign and English sounds.

2. Phonetic Analysis as an Instrument of Diagnosis

A thorough knowledge of phonetics on the part of the clinician will often enable him to make shrewd deductions as to the nature of the speech defect under observation, and thus serve as a short cut to the final diagnosis. In most instances, the articulatory syndrome is to be regarded as pointing to, or suggesting, a given type of defect arising from a given cause, rather than proving definitely the nature of the case. This is because there are many factors influencing the specific articulatory defects that arise from a given cause, and because there is much overlapping in the articulatory symptoms arising from different causes. Nevertheless, such speech defects as those arising from infantile perseveration, tongue-tie, foreign dialect, sectional dialect, lingual paralysis, malformation of the teeth, hard-of-hearing conditions, etc., do show characteristic articulatory pictures that distinguish each from the others. So true is this that, not only can foreign dialect be distinguished from baby talk or paralytic speech on the basis of the articulatory lapses, but the expert can also detect whether the foreign dialect case is himself an immigrant or the child of an immigrant, and can usually name the foreign language from which the dialect originated. The broken English of an Italian immigrant differs materially from that of a Norwegian, and these differences often remain observable even unto the third and fourth generations.

It is not the purpose of this chapter to catalogue the articulatory syndromes that arise from various types of speech defects. Such material is difficult to reduce to lists and, even if so arranged, can scarcely be mastered through memorization. Furthermore, it must be borne in mind that such listings of defects can be quite misleading if interpreted from an insufficient background. For example, to say categorically that infantile speech is characterized by the substitution of [w] for [r] is something less than half the truth. Lingual paralysis might likewise be so characterized, as might certain types of hearing deficiencies, or even tongue-tie. We can lay down a general principle that individual articulatory lapses are of little significance in differentiating one type of speech defect from another—it is the complete articulatory picture that furnishes the clue to the type and cause of the defect. This picture must be seen by the clinician in its entirety and with all of its implications. He must make mental comparisons with known articulatory lapses in other cases and look for similarities and differences.

This leads us to the second principle in the use of phonetics as a diagnostic device—namely, that diagnosis based on phonetic lapses is essentially a reasoning, not a cataloging, process. As such, it is an ability grounded on a thorough knowledge of phonetics on the one hand and of speech correction on the other. It is not to be learned through lists or recipes.

The following analysis will serve to illustrate this method of diagnosis.[2] It should be understood that this is not intended as an illustration of either a complete case history or of all of the steps in the diagnosis of a hypothetical case. It is intended only to indicate the manner in which the clinician can coordinate his knowledge of phonetics and of speech correction in the *preliminary* analysis of a case. For a simple illustration, we may assume a typical case of infantile perseveration in which a boy of ten shows the following articulatory lapses: [w] is substituted for [r] rather consistently; [θ] is used for [s] in many words, especially simple ones, although [s] can be, and often is, made correctly in more recently learned words; [v] is substituted for [ð] medially in words like *mother* and *brother*, but [t] is often used for initial [θ] as in *throw*, *through*, *thimble*, etc.; [d] is sometimes used for [ð] in such words as *then* and *those;* [j] is substituted for initial [l] in such words as *lady*, *lay* and *little*, but [l] is often made correctly when it occurs medially and is sometimes omitted entirely when it occurs in certain one-syllable words such as *milk*, *help* and *twelve*; [d] is used occasionally for initial [ɡ], but the medial and final sound is usually correct, unless omitted; [t] is likewise substituted for initial [k]; [h] or [ç] is sometimes used for [ʃ], but [ʃ] is sometimes substituted for [tʃ]; [n] is substituted for [ŋ] in many words, but *finger* is pronounced [fɪŋɝ̣].

Assuming that we have no knowledge of this case save for the articulatory syndrome described above, let us proceed to examine it from the diagnostic point of view, considering in turn the possibility that these symptoms might be caused by (1) tongue-tie, (2) foreign dialect, (3) a hearing deficiency and (4) paralysis. The possibility of a tongue-tie can be dismissed rather quickly. We know that when the lingual fraenum is over-short the upward movements of the tip of the tongue are restricted. This restriction must result either in the defective production of the high tongue-tip sounds or in the production of these sounds with the jaws closely approximated. The latter symptom is not present, and the first one is eliminated by the fact that in several instances high tongue-tip sounds are actually used in place of sounds in which the tip of the tongue is lower or in which the back of the tongue is active. Thus, [t] is substituted for [θ] and [k], [d] is used for [ð]. These observations can be checked quickly by testing the patient's ability to elevate the tip of the tongue.

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[2] For a similar analysis from a somewhat different angle, see West, Kennedy, and Carr, *The Rehabilitation of Speech.* Harper and Brothers, (New York, 1937) p. 179.

When we consider the possibility that a foreign dialect might operate to produce these symptoms, we note first that certain of the substitutions, i.e., [v] for [ð], [t] for [θ], [d] for [ð] and [ʃ] for [tʃ], are typical of many dialects. But other substitutions are decidedly not typical of foreign dialects. Outstanding among these is the use of [θ] for [s], a substitution that practically never occurs in any commonly known foreign dialect. In fact, the [θ] is missing in most of the languages from which these dialects stem, and some other sound—often [s] itself—is substituted for it. Likewise [w] is seldom substituted for [r] in dialectal speech, since nearly all languages have some variety of *r* which, although it may differ from the English *r*, is used in speaking our language. Non-standard *l*'s are often heard in foreign dialect, but the use of [j] for [l] is not typical. The substitutions of [t] and [d] for [k] and [g] are also not typical for foreign dialect. Practically all languages contain a back tongue plosive of some type, and corresponding dialectal English will show a non-standard [k] or [g] rather than the substitution of [t] and [d] for these sounds. Another highly significant clue in this connection is the absence of vowel errors. To the foreigner learning English, the vowels usually present more difficulties than the consonants. It is extremely unlikely that any case of foreign dialect would show errors only on consonant and glide sounds and not on vowels. For these reasons, we can feel reasonably safe in dismissing the possibility of foreign dialect, although we might want to keep in mind the possibility that a few of the errors may be influenced by this cause.

We turn our attention now to the possibility of a hearing deficiency. We note at least six instances in which more visible front sounds are used instead of less visible sounds made farther back in the mouth. These are: [w] for [r], [θ] for [s], [d] for [g], [t] for [k], [ʃ] and [t] for [tʃ], and [n] for [ŋ]. However, there are four instances in which less visible sounds are actually used in place of more visible ones: [j] for [l], [t] for [θ], [d] for [ð] and [h] or [ç] for [ʃ]. We can scarcely postulate a generalized deafness, because there are too many non-defective sounds. If we assume a general deafness sufficient to cause the defects noted, we must ask why there are so few defective glide sounds and no defective vowels, and why certain consonants [b], [p], [m], [f], [v], [t], [d], etc.—are not also occasionally defective, as they logically should be. We note also that, if there were a generalized deafness, we should expect many more sound omissions than seem to be present, and we should likewise expect some of the sounds to be produced defectively.

There is, of course, the possibility that we are dealing with a specialized range deafness. If so, we would have to assume a deficiency in both the middle frequency and the high frequency ranges. However, the possibility of a middle frequency range deafness is slight, since there are only two errors in this range, [w] for [r] and [j] for [l], and the latter of these occurs infrequently. There is a stronger possibility of a high frequency deafness, since there are many substitutions of sounds within this range and of such a nature that they could be explained by a specialized hearing deficiency. We note again, however, the small number of sound omissions and the absence of defectively produced sounds, both of which would normally be expected in high frequency deafness. We should also expect interchangings within the pairs [b-d], [p-t], [f-θ], [v-ð], [s-ʃ], etc., and these are not present. In the sound substitutions that are present there is a clear tendency to substitute more easily produced sounds for less easily produced ones. This is not necessarily characteristic of a hearing deficiency. Lastly, we remember that there is a marked inconsistency in the appearance of the substitutions, whereas if the difficulty lay in the hearing mechanism, we should expect more stereotyping of the errors.

We conclude, therefore, that a general deafness or a middle frequency deafness is quite improbable, and that while there is some evidence pointing toward a high frequency deafness it is by no means conclusive. We continue our analysis bearing in mind the possibility that the case may be complicated by a partial high frequency deafness.

The observation made previously that in almost every instance the substitution is of an easier sound for a more difficult one points strongly to the possibility of a paralysis. The fact that only the tongue sounds are affected would indicate a lingual paralysis. Since both front and back sounds are defective, we would have to assume a rather widespread paralysis of the tongue. There are, however, contrary observations. Chief among these is the fact that the errors are more frequent on short and relatively simple words than on longer and more complicated ones. This is in direct contrast to the situation that usually prevails in paralytic speech, in which the patient is often able to produce sounds correctly in isolation or in simple combinations, but has much difficulty with the same sounds when they occur in longer sequences calling for more complicated and rapid coordinations. We note again the absence of defectively produced sounds—a characteristic we would certainly expect in paralytic speech—and the absence of errors among the vowels. We would also expect more consistency in the errors in a case of paralytic speech; that is, we would expect the same type of error to appear more or less regularly. In our hypothetical case, the reverse is true, and sounds are produced correctly more often than incorrectly. With the possible exception of [r], all sounds are made correctly in one situation or another, and no sound is ever produced defectively. The errors are always substitutions or omissions. This argues strongly against a paralysis. In addition, we have no report of any tension accompanying speech—a characteristic that would be inevitable in paralytic speech. On these grounds, the presence of a paralysis seems to be ruled out.

Finally, we observe that all of the symptoms noted can be explained adequately on the basis of infantile perseveration. The substitutions are all characteristic of this type of speech. The inconsistency of the errors and the tendency to substitute easier sounds for harder ones are both typical symptoms of infantile speech. Every defect noted can be explained upon the basis of the assumption that we are dealing with a person who has learned to produce all of the sounds of English, except [r], and whose speech shows the results of a struggle between old, incorrect, habit patterns formed before certain sounds were acquired and newer, less stable, patterns that are largely correct. We might wish to safeguard ourselves by testing for high frequency deafness in order to eliminate any possibility that a hearing deficiency might be a contributing factor.

It should be emphasized again that this analysis is not intended to illustrate a complete diagnostic procedure. No attempt has been made to include all of the possible symptoms of infantile speech or to exhaust all of the possible causes of the symptoms noted. This example merely illustrates the use of phonetic knowledge in making a preliminary diagnosis of articulatory cases. Although the analysis may have seemed long when reduced to writing, it should be remembered that the experienced clinician will make these observations almost intuitively and will arrive quickly at a conclusion as to the probable nature of the case. When this is done, he can proceed without waste effort to further examinations designed to eliminate other likely possibilities and verify or disprove his tentative conclusions. The clinician must hold himself in readiness at all times to modify his original inferences in the light of additional information. The reader is warned that in the hands of an inexperienced worker who lacks a solid foundation in the fields of phonetics and speech correction, this type of phonetic diagnosis can be quite inaccurate and misleading.

3. PHONETIC TRAINING AS A THERAPEUTIC TECHNIQUE

We have commented previously upon the value of a knowledge of phonetics to both the clinician and the patient. It is our purpose here to particularize somewhat upon the uses of phonetics in the actual administration of clinical therapy. It is obvious that phonetic training is not applicable to all types of speech defects. However, such training does play an important part in the treatment of all articulatory defects, with the possible exception of those arising directly from emotional disorders. In general, we may say that phonetic training plays an important part in the following processes, any or all of which may be used in the correction of defective articulation: (1) teaching new sounds; (2) teaching proper compensatory movements where these are made necessary by structural abnormalities; (3) correcting sound substitutions and omissions; (4) giving ear training exercises; (5) strengthening new sounds by association; (6) stereotyping the motor patterns of new sounds by repetition; and (7) teaching the peculiarities of the English language.

Frequently the clinic patient has to be taught a sound that he has been unable to make or has, for some reason, failed to acquire. Among the various methods for teaching such new sounds,[3] three rely heavily upon the science of phonetics. (1) The simplest of these is based upon ear training, followed by trial and error-attempts to produce the sound. The correct sound is repeated many times for the patient, until he is thoroughly familiar with it. He is then asked to make a sound like the one heard, his efforts are criticized, additional ear training is given, and the process is repeated until the correct sound is produced. Once the correct form has been secured, attempts are made to bring about its repetition until it can be made easily. It is then ready for stereotyping into the pattern of every day speech.

(2) If this ear training method fails, the desired sound may be produced by the modification of related sounds. Thus [s] may be taught by approaching the sound from the position for dental *t*. The dental *t* serves to place the tongue in the approximate position for [s]. The sound [s], or one closely resembling it, can then be secured by showing the patient how to make a fricative, rather than a plosive from this position. The [ɹ], [r] and [ɝ] sounds may likewise be taught from the position for an alveolar *t* by means of a series of drills working from [tʰ] to [tɹ] to [tɹɑj] to [ɹɑj] to [rɑj] to [r-ɑj] to [ɝrɑj] to [ɝ] to [ɝlị]. Similarly [w] can be taught by means of a glide movement from [u] to [ɑ], and [ŋ] by asking the patient to prepare to pronounce [g] and direct the air through the nasal chambers by opening the soft palate. The above examples illustrate only a few of the many possibilities. The alert student will discover almost countless ways of using his knowledge of

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[3] See Van Riper, *Speech Correction*. Prentice-Hall, Inc., New York, 1939, pp. 238–247.

phonetics to lead the patient to produce a new sound through the avenue of one already mastered.

(3) The third method of teaching a new sound is sometimes called the "placement method." The patient is shown by means of charts, models, diagrams, and by direct observation of himself and other people just how the sound is made, i.e., the *placement* of the articulatory mechanism for the sound. He is then directed to place his articulatory mechanism in a similar position and produce a sound. After repeated trials under direction, a sound approaching the one desired may be obtained. It is obvious that all three of these methods for teaching a new sound are grounded in phonetics.

In still other cases, the primary problem is to teach the patient to compensate for some physical defect in the articulatory mechanism that prevents the correct production of certain sounds in the typical manner. Here again phonetic training is of paramount importance in assaying the structural defect, determining its relation to the defective sound, deciding whether, in view of the structural conditions, it will be possible to teach the patient to make the sound in the normal manner, and, if not, selecting the compensatory movements to be taught. Such compensation involves teaching the patient to make certain movements not ordinarily typical of the sound, in order to make allowances for the structural defect and to produce an acoustically acceptable sound. The clinician must synthesize his knowledge of the articulatory mechanism with his knowledge of the minimum essentials for any given speech sound, the manner in which it is normally produced, its acoustic characteristics, and especially the problems involved in effecting smooth transitions from this sound to others in a normal speech situation.

To put this in the form of an example, the clinician may decide that a certain patient has a defective *s* of the "spread" type, because of a wide space on the midline between the two upper incisors. He may further decide that this structural deficiency precludes the making of a normal *s* in the typical manner. A further survey of the situation leads the clinician to decide that the patient could best produce an acoustically acceptable *s* by making it far to the side, perhaps over one of the premolars that seems to be well located for the purpose. This possibility is discarded, however, on the grounds that the movements accompanying the sound attract unfavorable attention, and because transitions to certain other sounds are awkward. The clinician finally decides that the best procedure will be to teach the patient a somewhat lateral *s* made over one of the canines. The result is a sound far superior to the original defective *s*, but not so good as the one that could have been made farther laterally. However, it is not accompanied by conspicious movements, and it blends easily with other sounds.

Another problem that confronts the speech clinician even more frequently is that of correcting sound substitutions and omissions. In such cases there are often no structural defects and no sounds that the patient is incapable of making. Instead, certain correctly made sounds are substituted for each other, used in non-standard positions, or omitted. The problem here is basically one of breaking down certain incorrect habits of sound usage and establishing correct ones. This is the major problem in correcting foreign dialect, and the phonetic principles involved have already been presented in Chapter I of this Section. The techniques of ear training, association, and strengthening described in the following pages are especially applicable to this type of defect.

Regardless, however, of whether the problem is one of teaching an entirely new sound, teaching compensatory movements, or correcting sound substitutions, the techniques of ear training play an important part. By ear training, we mean the process of teaching an individual to *isolate, recognize,* and *discriminate* speech sounds. Isolation involves the ability to separate words and syllables into sound units; recognition, the ability to identify a sound properly; and discrimination, the ability to distinguish a sound from closely related sounds or from defective versions of the sound. Van Riper[4] presents specific techniques for such ear training. We need only note here that this training is the direct equivalent of teaching certain phases of phonetics to the patient, and that the clinician who wishes to give such training must be grounded in phonetic science.

A process closely allied to ear training is that of association, by which we mean the establishing of proper connections between the sound and other aspects of language in such a way as to fix the sound firmly in the associative process. This may be accomplished by associating it with its phonetic symbol, its various orthographic representations, or by tying it up with a picture, a name, a sound made by some animal or machine, etc. For example, the sound of *s* might be associated with its symbol [s], its various spellings, *s*, *ss*, *c*, etc., with a picture of a snake, and with the traditional hissing sound made by a snake. Such associative techniques help to establish the sound firmly in mind so that it can be recalled instantly when needed for speech.

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[4] *Op. cit.,* 227–238.

In addition to the processes of ear training and association, there still remains the problem of strengthening or stereotyping the motor patterns of new sounds and new combinations of sound. This involves the repetition of the correct form of the sound, both in and out of speech context, until the motor pattern for it is firmly fixed, and the sound is produced automatically when it occurs in speech. This is, as it were, the capstone of the corrective process. Unless the correct sounds can be so stereotyped in their production, the original defects will continually re-occur. The selection of adequate drill material for this purpose, the supervision of the drill to the end that the correct form and not the error is practiced, and the decision as to when the stereotyping process is completed, are all matters that require training in phonetics.

In concluding this discussion of the place of phonetics in speech correction, it should be mentioned that each language has certain peculiarities and characteristics that must be mastered if the speaker is to be fluent and free from error. Ordinarily, these are mastered automatically by the maturing child; but some types of defective speech, particularly sectional and foreign dialect, are characterized in part by the failure to master these peculiarities of the language. We may list the following characteristics of English speech: (1) peculiarities of unstressing, including the use of the schwa, of strong and weak forms, of accent, of sound duration, and of tense and lax sounds; (2) the widespread use of glide sounds; (3) unusual patterns of aspiration and unaspiration and fortis and lenis effects; and (4) the intonation pattern. If any of these characteristics must be taught, the best approach is from the standpoint of phonetics. In fact, problems arising out of the first three characteristics can be handled adequately only by one who is trained in this field.

In this chapter, we have tried to show the general relationship between training in phonetics and the work of the clinician with the patient. We have discussed the application of phonetics to the diagnosis of articulatory defects and the uses of phonetic training in certain remedial techniques. The science of phonetics has many important and immediate applications, and one of the greatest of these is in the field of speech correction.

Chapter 23

Phonetics and the Teaching of Speech

1. General Considerations

The first few years of a child's public school education are devoted mainly to acquiring a mastery of his native language. Language study continues to play an important part in his education throughout his stay in the public schools and occupies a considerable portion of his time at the college level. Omitting the appreciative and artistic aspects, mastery of a language involves three basic skills—speaking, reading, and writing the language. Underlying all three of these skills is a large group of customs, conventions, and precedents established by previous users of the language and embodied in the rules of grammar, orthoëpy and orthography.

It is worth noting that the average child comes to the public school teacher with some four years of practice in speaking the language, and a like amount of unwitting practice in grammatical usage. On the other hand, the teacher, for all practical purposes, starts from the beginning in the teaching of reading, writing, and spelling. It seems self-evident that the most basic of these language skills is the ability to speak the language, yet this skill receives only haphazard attention —and often no attention at all—in the formal education of the child. Back of this neglect is the assumption, implied or direct, that the child learns to speak "naturally" and therefore that little or no attention need be paid to this phase of his language development.

It can scarcely be said, however, that it is any more natural for a child to learn to talk than it is for him to learn to read and write. All three processes are highly artificial and must be learned. Speaking is set apart from reading and writing, not by any basic difference in the learning process, but by the fact that speech is ordinarily learned from the age of two onward, under the tutelage of all those who speak to the child, whereas reading and writing are learned from the age of six onward, primarily under the tutelage of the classroom teacher. To argue that four years of pre-school practice in speaking makes further specific efforts to master this skill unnecessary is as bootless as to argue that this same four years of practice in the use of grammar makes further teaching in this field unnecessary. As a matter of fact, these years of pre-school practice frequently impose an additional handicap upon the teacher, inasmuch as he must first overcome the incorrect habits set up during this period. The teaching of reading, writing, and spelling is facilitated by the fact that the teacher has an opportunity to inculcate correct habits at the beginning of training.

It is the purpose of this chapter to evaluate the place of the science of phonetics in the process of improving the pupil's mastery of his native language in its spoken form.[1] It is obvious that there are many facets to this problem and that phonetics cannot be thought of as a panacea for all speech ills. It should, however, be a useful tool in that phase of the mastery of oral language that has to do with the correct utterance of speech sounds and with the combination of these sounds into words and continuous speech.

It should be clear at the outset that the issue is not whether phonetics shall be taught in the public schools, but rather whether phonetic principles are of sufficient value as *a tool in speech education* to warrant their use. Since many modern schools are already making use of phonetics as a tool in teaching (usually under the name of phonics), the issues will be further clarified if we consider them as being, basically as follows: (1) How much phonetic science can be used profitably in the teaching of speech in the public schools? (2) At what age levels can phonetic training be introduced most advantageously? (3) Should the phonetic symbols be taught?

Before considering these questions, let us note for a moment some of the conditions that have served to handicap the use of phonetics as an instrument of instruction in the public schools. The first of these has already been mentioned—the erroneous though widespread view that since speech is learned early it does not require any special training to bring it to perfection. It should not require much observation of the speech of typical school children to prove the falsity of this assumption, yet for various reasons this philosophy is prevalent enough to be an effective bar to speech training of any kind in many communities. In the second place, there is a lack of teachers adequately equipped to use phonetics effectively as a tool in classroom teaching. A semester of college training in a phonetics course designed to meet the immediate practical needs of the public school situation would be of immense value to the teacher, yet surprisingly few have had such a course. However, this situation is easily remediable, if the right people once become convinced that such phonetic training is desirable. The third drawback to a more widespread use of phonetics is the lack of suitable material adapted to the lower levels of education. Teachers who desire to use phonetics as a teaching device are dependent largely upon their own resources for teaching techniques, aids, and materials. This situation has been remedied somewhat of recent years,[2] and it is certain that increasing demand will bring additional valuable material to publication.

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[1] The reader will find valuable supplementary material in the two books here listed: Raubicheck, Letitia, *How to Teach Good Speech in the Elementary Schools,* Noble and Noble, N. Y., 1937, Chapters XI to XIV, and, by the same author, *Teaching Speech in Secondary Schools,* Prentice-Hall, New York, 1936, Chapter IV.

The Expression Company, 16 Harcourt Street, Boston, Massachusetts, has taken the lead in the publication of such material. A partial list of their publications in this field is given below:

Arnold, Genevieve, *Articulation and Sound Recognition Test* (for kindergarten and primary children), *Sound-Discrimination Test* (for pre-school and primary grades), *Speech-O A Phonetic Game, Sound Ladder Game, Progressive Sound Game and Sound and Articulation Card Game.*
Barrows, Sarah T., *Jack in the Box.*
Barrows, Sarah T. and Hall, Katherine H., *Games and Jingles for Speech Development.*
Bennett, Rodney, *First Steps in Speech Training.*
Bennett, Rodney, *The Play Way of Speech Training.*
Case-Livingston, Ida, and Barrows, Sarah T., *Speech Drills for Children in the Form of Play.*
Finley, Grace S. and Scovel, Margaret Hay, *Speech and Play.*
MacLearie, Elizabeth C., *Track and Sound Game,* and *Sentence Card Game.*
Schoolfield, Lucille D., *Better Speech and Better Reading.*
Stoddard, Clara B., *Sounds for Little Folks—Speech Improvement and Correction.*

Other publications of a similar nature are:

Cook, H. Caldwell, *The Play Way.* Stokes, 1919.
Daniels, Fannie F., *Good Speech Primer.* E. P. Dutton and Co., N. Y., 1935.
King, Hilda E., *Speech Training for Infants.* Thomas Nelson, N. Y., 1936.
Pray, Sophie, and Others, *Graded Objectives for Teaching Good American Speech.* E. P. Dutton and Co., N. Y., 1934.

The fourth, and probably greatest, deterrent to the use of phonetics—particularly of phonetic symbols—has been and is a total lack of dictionaries giving pronunciation in phonetic symbols and adapted to grade and high school children. The two dictionaries using phonetic symbols[3] are for adults. They give pronunciation only—not meaning or derivation. There are no dictionaries using phonetic symbols adapted to any other age level. This situation has limited the value of phonetic training and of teaching the phonetic alphabet to such benefits as may accrue in increased correctness in speech and in more accurate knowledge of the principles of pronunciation. It has deprived phonetics of the very valuable long-term advantages that would arise if reference dictionaries showing pronunciation in phonetic symbols were available to the pupil. This situation has created something of a vicious circle—phonetic dictionaries have not been published because there has not been a sufficient demand to make such a venture profitable. On the other hand, the demand has been in part stifled by the absence of such dictionaries. Not to be overlooked in this connection is the vested interest in diacritic markings as represented by the many dictionaries now in use. In the nature of things, it will probably be necessary to create the demand before publication of phonetic dictionaries can be expected. In the meantime, the use of phonetics in the public schools must be justified on some basis other than the immediate use of the symbols in looking up the pronunciation of words.

Sample, Anna E., *Primary Games to Teach Phonetics.* Beckley-Cardy, Chicago, 1925.

Starkey, Mary F., Callery, Julia N. and Slattery, Lucy E., *Speech Training,* Vol. I (first year), Vol. II (second year) and *Teacher's Manual.* Thomas Nelson, N. Y., 1935.

Wood, Alice L., *The Jingle Book for Speech Correction.* E. P. Dutton and Co., N. Y., 1934.

The following articles in *The Quarterly Journal of Speech* will be of interest:

Engles, Edna M., "Classroom Techniques in Teaching Phonetics," February, 1934, Vol. XX, No. 1, pp. 110–113.

Poole, Irene, "Speech Sounds and Speech Games," February 1934, Vol. XX, No. 1, pp. 102–110.

Ryan, Marjorie Lennox. "International Phonetics in the First Grade," February, 1934, Vol. XX, No. 1, pp. 113–115.

[3] Jones, *An English Pronouncing Dictionary,* and Palmer, Martin, and Blandford, *A Dictionary of English Pronunciation with American Variants.* See Annotated Bibliography.

2. GOALS IN PHONETIC TRAINING

The question as to how much phonetic training should be given in the public schools can best be answered in terms of the goals of such training and the relationship of phonetic science to the achievement of these goals. The primary goal is obviously an increased ability to speak the language. This means that phonetic training should aid in the elimination of speech defects and in the normal development of skill in speech. Phonetic study will likewise yield valuable by-products in an increased appreciation and understanding of one's native language, but these are incidental to the main purpose.

The study of phonetics occupies the same relationship to skill in speaking that the study of music does to piano playing, or the study of form and techniques to golfing. It is of course possible to play the piano "by ear" or to learn to play golf by trial and error, and some individuals achieve reasonably satisfactory results by these methods. It is commonly recognized, however, that in any activity demanding muscular skill—boxing, swimming, dancing, running, singing, playing golf, tennis, football or any similar sport—the peak of perfection is reached by those who analyze and study consciously the component parts of the activity until they have found the most effective techniques, and then practice these techniques diligently until their performance becomes automatic.

The articulatory aspects of speech represent, from one point of view, a muscular skill similar in basic principles to any of the activities listed above. It follows that the most efficient way to correct speech defects in school children or to increase their normal speech skill is to approach the articulatory aspects of speech training as if it were a muscular skill. This is the essence of the phonetic approach to speech training. If we accept this purely utilitarian goal as primary and the phonetic approach as the most efficient, we can say that as a minimum there should be enough phonetic training to give the public school pupil (1) a knowledge of the individual sound units of his native language, (2) the ability to produce these sound units accurately, (3) the ability to recognize these sound units when they are produced correctly and to recognize deviations from these sounds in his own speech and in that of others, (4) the ability to produce the various sound combinations common to English and to use these sounds and sound combinations easily and automatically in words and continuous speech, (5) a knowledge of the relationship of the spoken and written forms of the language, (6) criteria and standards for making decisions as to "correct" pronunciation and acceptable forms of speech, and (7) a tool for self-help.

3. The Age Level for the Introduction of Phonetic Training

The question as to the age level at which phonetic training should be introduced is easily answered—the earlier the better. The longer a golfer plays by trial and error, the more difficult is the task of learning to play the game right. Similarly, the longer a school child uses incorrect forms of speech, the more difficult it is for him to overcome his defects and the more he is slowed down in his normal speech development. Furthermore, children seem more adept than adults at grasping phonetic concepts, particularly the idea of separate speech sounds. It is as if the more ingrained and automatic speech becomes, the more difficult it is for the individual to think of it in terms of its component parts and to revamp habits of speaking.

Under ideal conditions specific training should be begun in the first grade. Such training is no more difficult than reading. Children enjoy the work when it is presented in the form of games and play with techniques appropriate to their age. Certainly, for the maximum benefit to speech, phonetic training should be introduced sometime within the first four years. If such training can be given along with reading, writing, and spelling, these disciplines supplement each other, and some of the confusion that normally develops because of the gap between spelling and pronunciation is avoided.

Assuming that phonetic training can be started in the first grade, the objectives of the work in articulation and pronunciation during the first four years might be outlined as follows:

First and Second Grades

(1) A knowledge of the sound units of English.

(2) The ability to recognize these sounds when made correctly.
(3) The ability to recognize deviations from these sounds, particularly undesirable deviations.
(4) The ability to produce each sound correctly in isolation.
(5) The elimination so far as possible of common errors in pronunciation.

Third Grade

(1) Finish the task of eliminating articulatory defects so far as these are remediable.
(2) Mastery of sound combinations common to English.
(3) Study of the relationship between spelling and pronunciation.

Fourth Grade

(1) Further study of the rules of pronunciation and of the relationship between pronunciation and spelling.
(2) Classification of speech sounds and study of the relationships between sounds.
(3) Ability to use strong and weak forms correctly in speaking and reading.
(4) Ability to use the dictionary for self-help through study of the diacritic markings.
(5) Formulation of criteria for determining questions of correctness and good form in speech.

Beyond the fourth grade, the pupil will be primarily concerned with other aspects of speech, and his work in articulation and pronunciation will continue along the lines laid down in the first four years.

Unfortunately, school situations are often far from ideal, and the teacher in the upper grades or high school must often decide whether or not it would be profitable to give phonetic training to pupils who have had no previous work in the subject. Phonetic training at any age level can be well worthwhile, but the decision as to whether or not it should be given must be made in terms of specific situations. Generally speaking, if there are extensive problems of articulation and pronunciation, and if there is sufficient time to be devoted to them, the phonetic approach will save time and give better results.

4. The Use of Phonetic Symbols

The question is frequently raised as to whether or not it is necessary to teach the phonetic symbols. It is entirely possible to use the phonetic approach to speech training without making use of a phonetic alphabet, and in some instances this may be the logical procedure. However, such training is greatly facilitated if the symbols are taught and used. The same reasons advanced for the use of phonetic symbols in speech corrective work (see Chapter 22) apply equally well here. It is apparently no more difficult for a child to learn the phonetic alphabet than it is for him to learn the written alphabet or the numerical system. The pupil learns that certain signs stand for sounds and are used to represent speech as it is spoken, and that these are distinct from the letters of the alphabet used in reading. He learns thus an ear alphabet and an eye alphabet. Instead of confusing the child this actually adds to his understanding of, and ability in, both reading and spelling. If the symbols are to be taught, better results will be obtained if the concept of a given sound and a feeling of the need for a symbol to represent it are developed before the symbol itself is presented. Whenever it is possible for teachers in two or more consecutive grades to cooperate in the use of the symbols, it will probably be worthwhile to teach them in the lower grade. However, if they are to be used for only a short time and then discarded, the advantages gained by their use may not compensate for the time spent in teaching them.

5. Phonetics at the College Level

While this chapter is concerned primarily with the use of phonetics in the public schools, it will not be amiss to comment briefly on the possible applications of phonetic training at the college level. We have already had occasion to point out the place of phonetics in speech correction, in the treatment of foreign dialect and in the learning of foreign languages. Phonetics is likewise a valuable aid in fundamental courses in speech, in public speaking and voice training courses—in fact in any situation where speech improvement involves matters of articulation and pronunciation. A somewhat different application of the science is found in drama and interpretation work in which a knowledge of phonetics may be put to use in preparing a dialect reading or in training the actor for a dialect part in a play. The college student will find that a knowledge of phonetics will greatly increase his understanding of speech problems and his ability to improve his own speech. Certainly phonetic training should be an integral part of the preparation of every college student who plans to teach in the field of speech.

APPENDICES

Appendix A

Words and Phrases for Transcription Practice

The best way to learn the phonetic alphabet is to use the symbols frequently in transcription. The following lists of words and phrases are intended as practice material. They are arranged to exemplify certain sounds or groups of related sounds in the order in which these sounds are discussed in the text. *It should not be taken for granted that every word in a given list necessarily contains the sound that is being illustrated.* Such is often not the case. These lists are not intended to show how words should be pronounced. Their primary purpose is to provide material for practice in transcription which will at the same time stimulate the student's thinking in problems within the field of phonetics.

There are other secondary values to be derived from this material: The word lists are designed in part to show some of the various spellings of the sounds illustrated. They are also intended to raise problems in pronunciation and to indicate some of the variations that exist in the use of sounds. Within a given list, consequently, some of the words may be included because they represent the typical spelling and pronunciation of the sound under consideration. Others may be included because they represent unusual spellings, and others because they present problems in variant pronunciations and raise questions of "correctness."

The instructor will find that the benefits to be derived from such transcription practice can be increased by varying the nature of the assignments. For the most part the student will transcribe the words in his own natural pronunciation. Occasionally, however, he should be asked to transcribe a list in accordance with the pronunciation given in some standard dictionary, or in what he considers to be "standard" speech for his section of the country. Still other variations can be made by asking the student to transcribe the words in what he considers to be "sub-standard" speech for his section of the country, to transcribe someone else's pronunciations, or to transcribe in stage speech, southern speech, eastern speech, etc.

If such transcription practice is introduced early in the course, as it should be, the student may not yet be familiar with the symbols for some of the sounds. The authors believe, however, that if the words were so selected as to include only the sounds already studied plus those for which the phonetic symbol is the same as the usual spelling, the lists would be simplified to the point where they would lose much of their illustrative value. Consequently no attempt has been made to exclude words requiring symbols not yet familiar to the student. It is suggested, rather, that at the beginning of the course the student concentrate on transcribing the illustrative portion of the word and write in the spelling of those sounds for which he does not know the symbols. The student should study each word carefully before transcribing it. Many of the words raise interesting problems in pronunciation, while others illustrate basic concepts in the science of phonetics. The instructor will find it worthwhile to compare occasionally the student's pronunciation with his transcription in order to help sensitize him to his own speech patterns.

[ʌ]

1. tub
2. come
3. brusque
4. rough
5. does
6. doth
7. double
8. blood
9. frontier
10. constable
11. among
12. along
13. buck
14. hiccough
15. unction
16. bomb
17. ruddy
18. above
19. ultra
20. plover

[ɑ]

1. sergeant
2. hearth
3. wash
4. holiday
5. was
6. from
7. posterior
8. guard
9. flock
10. rajah
11. bazaar
12. onward
13. amen
14. psalm

15. loll
16. quality
17. knowledge
18. almond
19. salaam
20. object

[æ]

1. mad
2. ant
3. draught
4. shaft
5. plank
6. rank
7. crack
8. baggage
9. casual
10. character
11. plaid
12. anxious
13. can’t
14. hand
15. stand
16. arrow
17. sparrow
18. absolute
19. agate
20. bag

[æ] [a] [ɑ]

1. laugh
2. aunt
3. task
4. class
5. calf
6. can’t
7. craft
8. dance
9. France
10. half
11. demand
12. grass
13. staff
14. after
15. past
16. ghastly
17. chance
18. answer
19. advantage
20. telegraph

[ɛ]

1. pep
2. head
3. knell
4. egg
5. says
6. Thames
7. friend
8. fiend
9. element
10. genuine
11. leopard
12. Leopold
13. many
14. said
15. again
16. leg
17. primary
18. air
19. bear
20. bare
21. cleanly
22. carry
23. many
24. merry

25. many
26. pair
27. pear
28. pare
29. vary
30. bury

[e] [ej]

1. abate
2. chaotic
3. chaos
4. fatal
5. fatality
6. maintain
7. locate
8. location
9. designate
10. designation

[ɪ]

1. mint
2. since
3. tryst
4. hear
5. hearty
6. business
7. sieve
8. English
9. hymn
10. city
11. ready
12. Monday
13. holiday
14. character
15. minute
16. prepare
17. biscuit
18. women
19. empty
20. built

[i]

1. deceive
2. least
3. feet
4. re-tell
5. praline
6. receipt
7. recipe
8. tepid
9. creek
10. people
11. atheist
12. monkey
13. Caesar
14. eon
15. serious
16. cereal
17. repeat
18. penalize
19. leisure
20. breeches

[ɔ]

1. fraught
2. talk
3. soft
4. broad

5. war
6. office
7. bought
8. for
9. more
10. log
11. down
12. stalk
13. pause
14. are
15. or
16. daub
17. fare
18. wasp
19. swamp
20. water

[ɑ] [ɒ] [ɔ]

1. not
2. odd
3. mock
4. what
5. soft
6. hospital
7. sorry
8. watch
9. possible
10. foreign
11. orange
12. coffee
13. off
14. often
15. cloth
16. stock
17. hog
18. bog
19. frog
20. warrant
21. laundry
22. Washington
23. posse
24. daughter
25. pa and ma
26. Oregon
27. wash
28. gone
29. horrible
30. what

[o] [ow]

1. veto
2. vetoed
3. rotate
4. rotation
5. rote
6. connotation
7. bowl
8. bowling
9. orate
10. oration
11. oratory
12. denote
13. denotation
14. annotate
15. hobo
16. potato
17. console
18. consolation
19. motto
20. flotilla

[ʊ]

1. coop
2. could
3. full
4. wolf
5. cupful
6. bosom

7. forsook
8. look
9. rook
10. stood

[u]

1. two
2. school
3. Louise
4. true
5. voodoo
6. shoe
7. group
8. Sault St. Marie
9. Sauk City
10. coupon
11. fruit
12. noon
13. tattoo
14. ghoul
15. tomb
16. Andrew
17. Sioux
18. movie
19. duty
20. student

[ʊ] [u]

1. soot
2. room
3. broom
4. soon
5. spoon
6. woof
7. poor
8. root
9. cooper
10. roof
11. hoof
12. rooster
13. coop
14. your
15. hoop
16. sure

[ɜ] [ɝ]

1. church
2. heard
3. pretty
4. shirt
5. pert
6. myrtle
7. journey
8. colonel
9. America
10. purr
11. stirring
12. hurry
13. worry
14. courage
15. current
16. thorough
17. guerdon
18. virulent
19. fur
20. furry

[ɜ̣] [ə] [ɝ̣] [ər]

1. betterment
2. flattery
3. better
4. altar
5. mirror
6. prefer
7. preference
8. perspire
9. prescribe
10. umbrella
11. history
12. perverse
13. songster
14. anger
15. singer
16. perjury
17. perjure
18. furrier
19. courtier
20. periphery

[ʟ̣] [əl]

1. sample
2. cradle
3. crackle
4. battled
5. chortled
6. snarled
7. missile
8. tabled
9. jostled
10. preamble
11. tooled
12. schooling
13. curling
14. bubble
15. bubbling
16. troubling
17. swivel
18. trifle
19. nasalize
20. whittling

[ə]

1. basket
2. batted
3. integral
4. doorman
5. ultimatum
6. betrayal
7. peripatetic
8. breakfast
9. gentleman
10. judgment
11. quiet
12. notable
13. potation
14. account
15. quality
16. specimen
17. ability
18. difficult
19. vanilla
20. appeal
21. agree
22. soda
23. cinema
24. sycamore
25. considerable
26. analysis
27. gradation
28. suffocate
29. adage
30. furnace
31. tennis
32. baited
33. civil
34. civility
35. approachable
36. apply

37. applicant
38. fistula
39. tomato
40. basis

[h]

1. annihilate
2. humble
3. herb
4. behead
5. ahem
6. ahoy
7. likelihood
8. lighthouse
9. high house
10. shepherd
11. human
12. whoop
13. pothole
14. mishap
15. perhaps
16. unhook
17. anyhow
18. behind
19. big horse
20. toe-hold

[ʔ]

1. little
2. bottle
3. cackle
4. sentence
5. couldn't
6. wouldn't
7. gentle
8. utmost
9. alacrity
10. black hole
11. we entered
12. two hours
13. three eagles
14. two eyes
15. too wise
16. I said *out* not *in*
17. he *always* fails
18. where *are* you?
19. Oh! Oh!
20. no onions

[w] glides

1. weak
2. woo
3. awe
4. clown
5. found
6. trowel
7. will
8. nitwit
9. moat
10. pole
11. hobo
12. twirl
13. quit
14. sword
15. sward
16. toward
17. shadow
18. shadowing
19. owing
20. hoeing
21. beau
22. soul
23. bowl
24. though
25. wooing
26. opinion
27. throwing

28. plowing
29. doing
30. winnowing
31. around
32. sound
33. potato
34. bowing
35. howl
36. trawler
37. oust
38. are you ill?
39. did you ever?
40. so overcome

[ħw] glides

1. whoa
2. whirl
3. which
4. witch
5. what
6. watt
7. who
8. whose
9. where
10. wear
11. erstwhile
12. somewhat
13. wharf
14. quite
15. Dwight
16. quick
17. why
18. tu-whit, tu-whoo
19. Whig
20. whom

[j] glides

1. yeast
2. yawl
3. bayonet
4. Mayan
5. mayor
6. yellow
7. loyal
8. million
9. alien
10. value
11. union
12. amiable
13. neigh
14. waif
15. Yale
16. ideal
17. idle
18. mail
19. joist
20. clay
21. idolize
22. educate
23. rye
24. alloy
25. ewe
26. volume
27. buoy
28. aisle
29. Europe
30. diameter
31. view
32. rude
33. lieu
34. imbue
35. cue
36. future
37. amuse
38. beauty
39. pure
40. stupid

[ħj] glides

1. huge
2. hue
3. humor
4. human
5. humid
6. tube

7. tune
8. cupid
9. putrid
10. humilitate

[r] glides

1. rare
2. rear
3. rue
4. roar
5. yearly
6. chord
7. rural
8. rhubarb
9. railroad
10. very

[l] glides

1. lolling
2. lily
3. mail
4. lark
5. walk
6. milk
7. bulk
8. balk
9. label
10. allow

[f] [v]

1. Stephen
2. diphthong
3. very
4. nephew
5. fluff
6. phonate
7. vivid
8. diffuse
9. halve
10. rough
11. caveman
12. valve
13. prophet
14. soften
15. of the people
16. laugh
17. fifth
18. half full
19. I have to go
20. I have it

[θ] [ð]

1. tithe
2. wither
3. theme
4. youths
5. worthy
6. worth
7. thorn
8. strength
9. these
10. lengthen
11. thimble
12. thither
13. clothe
14. method

15. mouths
16. southern
17. loathe
18. breathe
19. worthy
20. paths

[s] [z]

1. zigzag
2. absurd
3. absolve
4. exit
5. mass
6. houses
7. bases
8. essence
9. fence
10. hose
11. explosion
12. raise
13. pansies
14. sure
15. scent
16. muscle
17. corps
18. scissors
19. discern
20. exhibit

[ʃ] [ʒ]

1. beige
2. garage
3. hosier
4. precious
5. ration
6. vision
7. mission
8. Charlotte
9. sugar
10. treasure
11. sagacious
12. seizure
13. cushion
14. rouge
15. azure
16. machine
17. bijou
18. issue
19. vicious
20. special

[p] [b]

1. hobby
2. thumb
3. table
4. purple
5. proper
6. hiccough
7. pumpkin
8. empty
9. raspberry
10. comb
11. glimpse
12. cupboard
13. warmth
14. hop toad
15. rub down
16. tub brush
17. grandpa
18. captain
19. cap and gown
20. cabman
21. cap full
22. capture
23. Bob will come
24. a cab very full

25. lap five
26. campfire
27. lampwick
28. thimble
29. cabin by the lake
30. thump Bob

[t] [d]

1. dreadful
2. dawdle
3. traded
4. asked
5. hasten
6. tempted
7. Christmas
8. handsome
9. friendship
10. thyme
11. postman
12. handful
13. sadder
14. satisfy
15. little
16. kitty
17. acted
18. rinse
19. since
20. tenth
21. nutcracker
22. pitfall
23. bid high
24. slit open
25. slip down
26. a slick trick
27. a slim dog
28. a fine deal
29. a good deal
30. a great deal

[k] [c] [g] [ɟ]

1. chromium
2. pick
3. concede
4. goggle
5. tie
6. ghost
7. luxury
8. exist
9. success
10. Bach
11. eke
12. morgue
13. thicken
14. pickle
15. awkward
16. extinct
17. exact
18. quick
19. acquire
20. length
21. bookcase
22. egg cup
23. dog leg
24. flag pole
25. bragging
26. rugby
27. black house
28. exquisite
29. big goose
30. sick cow

[ř] [ɾ] [ɹ] [r] [ᴙ]

1. trust
2. drape
3. very
4. drip
5. grip
6. rip
7. treed
8. greed
9. growl
10. gruel
11. berry
12. her own
13. ever and ever
14. purring
15. bread
16. shrive
17. throne
18. prairie
19. diary
20. cork

[m] [ɱ] [n̪] [n] [ɲ] [ŋ]

1. sickness
2. think
3. cotton
4. canst
5. egg-nog
6. sample
7. turpentine
8. inkling
9. omnibus
10. symbol
11. strangle
12. mangle
13. drinker
14. finger
15. wringer
16. augment
17. signal
18. single
19. angle
20. younger
21. humdrum
22. ninepin
23. hymnal
24. ingrate
25. camphor
26. man made
27. grandma
28. ninny
29. prank
30. income
31. ember
32. England
33. last night
34. last man
35. bottom
36. among my
37. black night
38. come very near
39. laugh more
40. above me

Affricate Combinations

[tʃ] [dʒ] etc.

1. eighth
2. tenth
3. latch
4. hatchet
5. stitch
6. hatched
7. ninth
8. witches
9. riches
10. Natchitoches
11. poached
12. blazed
13. blest
14. blushed
15. fudge
16. trade
17. drain
18. tests
19. pushed
20. dazed
21. paged
22. jousts
23. that thimble
24. sister
25. called them
26. don't they
27. not these
28. with Tom
29. bath towel
30. used to

Appendix B

Practice Material for Nonsense Dictation

Ear training, which has as its aim the developing of a keen sense of discrimination between sounds, is an important part of the study of phonetics. Practice in transcribing the speech of other people, as well as one's own speech, is a valuable exercise. However, one of the best ways to develop a sense of discrimination between sounds is through the use of nonsense material. It is almost inevitable that a listener will sometimes hear in another's pronunciation of familiar words his own stereotyped pronunciation of the same words. Consequently, when real words are used for dictation, there is always a danger that the student will transcribe the words as he himself would have pronounced them. This defeats the purpose of the drill. Practice in the transcription of meaningful speech should come after the student has developed the ability to discriminate between sounds, and after he has acquired the ability to listen to speech sounds objectively, divorcing the auditory stimulus from his own motor habits of pronunciation. These abilities are best developed by frequent practice in transcribing nonsense dictation. The merit of nonsense material lies in the fact that since the combinations of sounds are for the most part unfamiliar, they call for keener discriminations and they do not come in conflict with previously stereotyped motor speech patterns.

The nonsense material below is included to facilitate this training. It is graded in a general way from easy to more difficult exercises, and from nonsense syllables to nonsense words and phrases and finally nonsense sentences. It should be noted that when nonsense syllables are formed by combining three or four sounds, it is difficult to avoid completely combinations that resemble words. However, there are usually slight differences. This material can be used by the instructor as the basis for class practice in transcribing from dictation, or two or more students can drill each other by alternately dictating and transcribing. The usual procedure is for the person dictating to pronounce each unit distinctly two or three times, while the listener without further help writes in phonetic symbols what he thinks was said. Obviously, the success of this drill depends in large part upon the ability of the one doing the dictating to pronounce in exact accordance with the symbolization and to pronounce the same unit without deviation two or three times in succession. Incidentally, the value to be derived from learning to pronounce this material fluently is almost as great as that gained by learning to transcribe it accurately. Thus these exercises can be made to serve a double purpose.

1. *Vowel Drills*

A

1. mib
2. nʌs
3. kug
4. bɪp
5. tɛk
6. zɝf
7. kot
8. tæg
9. fɒv
10. bʟk

B

1. sɜn
2. met
3. tad
4. vɔl
5. mɝb
6. dɑn
7. lor
8. bɜp
9. wᴜk
10. pʌt

C

1. tɑd
2. rɝk
3. top
4. dan
5. wɒt
6. nʟd
7. næs
8. wɔr
9. had
10. sɛz

D

1. rol
2. bɒb
3. zif
4. lᴜv
5. kɝn
6. kit
7. vuf
8. sok
9. gɜk
10. sef

E

1. let
2. tuk
3. vɑk
4. pɒb
5. mʟk
6. nɝk
7. kif
8. zɪv
9. duz
10. sᴜd

F

1. pʟb
2. dɝb
3. sɒt
4. zʌm
5. sɜt
6. bæf
7. fɑt
8. pep
9. bab
10. sɔd

G

1. kɔp
2. pig
3. dæg
4. gav
5. sɔv
6. zʌt
7. sᴜk
8. vɒf
9. zɔt
10. kɑv

H

1. tɒv
2. pɑk
3. dob
4. zɝk
5. pʌv
6. veb
7. tɜb
8. dᴜv
9. teg
10. gob

I

1. bɪmə
2. tæ̣kɝ
3. tʌ̣mɜ
4. bɪtɑ
5. kạlɑ

J

1. ẹpok
2. kᴜpɝ̣
3. sɪti
4. tatə
5. rɒbɝ̣

K

1. vʌnʟ̣
2. hibu
3. bɝkʟ
4. betọ
5. sʟkə

L

1. fɛta
2. sitᴜ
3. pɪ̣kʌ
4. pʌkɔ
5. tapɑ

I

6. fɝzu
7. bɪ̣tɑ
8. ɑ̣lak
9. bʌrɝ
10. kɛpɪ

J

6. bɝsɔ̣
7. ɪ̣dʌk
8. fɔvə
9. vənʟ
10. wɔtᴜ̣

K

6. tɜ̣kɪ
7. sʌpo
8. zɒtɝ̣
9. fɔvɪ
10. dᴜle

L

6. fidɪ̣
7. tæ̣kɔ
8. kəsɑ
9. bʌpᴜ
10. dᴜbʌ

M

1. tɪpɪ̣d
2. ọbɔd
3. fɑdɝ
4. dẹtu
5. zɛpị
6. səzʌ
7. ɑkᴜp
8. əzak
9. bɪ̣zɔ
10. pɜbə

N

1. ætᴜp
2. ɒkit
3. bəsɛ
4. ɝpak
5. ɛvəf
6. æ̣tuk
7. tibu
8. kɜzə
9. ọpᴜk
10. dafɝ̣

O

1. ɑbətᴜ
2. ɪ̣pəte
3. ʌfɪ̣tæ
4. ɔpɝtɪ̣
5. badəti
6. tizusɪ̣
7. ẹdəzɔ
8. ætɪ̣bɝ
9. gɜbutə
10. kətæpọ

P

1. zæbədɑ
2. sotɪ̣pɔ
3. ịtabo
4. əkɪ̣pʌ
5. sizɒtæ
6. fɪtəpɑ
7. ɜkætə
8. æ̣pikə
9. ətɝkɪ̣
10. ɛstɔbə

Q

1. bʏtə
2. sɪ̣bɔ̃
3. bᴜ̣tu
4. fœtɐ
5. dɤfɛ̃
6. tɵbɪ̣
7. fytɝ̣
8. bɯzə
9. zɑ̃bõ
10. bøsə

R

1. fœvɔ̃
2. tɜbᴜ̣
3. vʏtə
4. fɪ̣bɑ̃
5. døvọ
6. pɝfɪ̣
7. fɤvᴜ
8. fʉtə
9. fᴜvɛ̃
10. bæbɐ

S

1. tidɪ
2. tʏdị
3. dᴜ̣vʌ
4. dɯfə
5. bʉbə
6. sɜfɔ
7. fitɛ̃
8. dɪbɔ̃
9. ọbyt
10. æ̣tʌp

T

1. sœpɪ̣
2. zubœ̃
3. dɒtə
4. bɜtẹ
5. bʏtɑ
6. sɝtæ
7. dɑ̃bɔ
8. ɤøtə
9. bɤtə
10. kɯbə

2. *Drills on the Laryngeal Modifications of the Vowels*

A

1. ɑpɑ
2. ɑpɑʔ
3. hɑpɑ
4. ʔɑʔɑ
5. hɑʔɑ
6. ʔɑhɑ

B

1. kɒtn̩
2. kɒʔn̩
3. kɒhn̩
4. kɒtən
5. kɒn
6. lɪʔɫ̣

C

1. lihʟ̣
2. bɑhn̩
3. ʔɑkɑ
4. həhɑ
5. ʔoʔo
6. kʌpm̩

D

1. kɔtə
2. hɔʔə
3. ʔɔʔən
4. ɔhən
5. pɑʔə
6. ʔʌʔm̩ʔæʔm̩

A	B	C	D
7. pɑhɑ	7. bækɹ̣	7. hæˀu	7. hupæ
8. pɑtɑ	8. lɑtəl	8. kʌˀṃ	8. hutɑl
9. pɑˀɑ	9. lɑtɹ̣	9. hʌpəm	9. ˀuthɑl
10. pɑtɑˀ	10. lɑtə	10. hiˀi	10. ˀuˀɑl

3. *Drills on Inter-vowel Glides*

A	B	C	D
1. wɑ	1. ɔr	1. aw	1. ʌr
2. ɑj	2. ɜw	2. ær	2. ʊl
3. ɑw	3. ɪr	3. il	3. ol
4. rɑ	4. or	4. æw	4. ɛj
5. jɑ	5. ow	5. ar	5. al
6. ɑl	6. er	6. ɪl	6. æə
7. ɑr	7. ʊr	7. ɛw	7. ej
8. lɑ	8. ɔw	8. ɑr	8. ɑl
9. ʌw	9. ɛr	9. ul	9. æj
10. ir	10. ur	10. ɪw	10. ɪə

E	F	G	H
1. owə	1. ɔj	1. ɑjɹ̣	1. mejrị
2. ɔl	2. ɜj	2. pɔr	2. stejl
3. ejr	3. ɔjɹ̣	3. mærị	3. meri
4. ɑj	4. jɔə	4. stejt	4. wejəl
5. ɛr	5. ɑwr	5. hɜrị	5. ruəl
6. æjə	6. jɑljə	6. mɒrɪ̣s	6. ejlijə
7. ɛjɚ̣	7. powɚ̣	7. mɛrị	7. ælɑjə
8. aj	8. wʌrɪ̣s	8. stel	8. wɔrlɪ̣
9. ɔjl	9. swərej	9. hɜrị	9. æwrlej
10. ʌj	10. hʌrɪ̣	10. mɑrɪ̣s	10. wɝleju

4. *Drills on Consonants and Nasal Sounds*

A	B	C	D
1. θat	1. bɒʃ	1. sɑγə	1. sịgɑ
2. bọðu	2. danʃɚ̣	2. βɑ	2. ħrɑ
3. bɜθ	3. siɟə	3. sɑxə	3. gu
4. ʒɒt	4. beç	4. aɸ	4. siɟɑ
5. hɪθɚ̣	5. sɔγə	5. ħwɑ	5. ci

A	B	C	D
6. bɜʒ	6. aβ	6. ʒ̣βɑ	6. kɑ
7. ðɔt	7. beɟə	7. ħjɑ	7. ŋjɑ
8. bəʒɹ̣	8. siç	8. aɸ	8. sɪɲə
9. loð	9. ɸɑ	9. ħlɑ	9. bɛɾɪ̣
10. ʃik	10. sɔxə	10. ɟi	10. ʁɑ

E	F	G	H
1. fʌɾɪ̣	1. wɛЯ	1. nɑ	1. θejʌɱɔ
2. briðz	2. ɑʁ	2. sɒɲ	2. ŋkθ
3. sikɑ	3. lʌkt	3. θři	3. nɪps
4. ʋ̣nŋgɑ	4. mɑ	4. ʀ̌ɑ	4. kЯɔθs
5. sɪ̣ŋʌ	5. sɪɲ	5. hɛmnə	5. frejð
6. Яoz	6. dɹɔj	6. njɑ	6. fɑfθs
7. sɪɲnɝ̣	7. gЯɑs	7. ðřaj	7. ɸifajθow
8. sicɑ	8. brejuz	8. ɾi	8. tɹʌʃ
9. ʊŋgɑ	9. wɜpt	9. ŋjɑ	9. ʒɑvæ
10. tɹi	10. lɑrkt	10. θufu	10. ʃowvɛ

5. *Drills on Affricate Combinations*

A	B	C	D
1. pɸɑ	1. ɑɸp	1. uʃts	1. æðd
2. ɑbβɑ	2. zdʟ	2. rɑʒdz	2. nɑtsi
3. ʒdu	3. tiçc	3. kɪtθs	3. tʃi
4. cçi	4. dzɔ	4. tθɛŋ	4. dðɑf
5. ɸpɑ	5. ɑβbɑ	5. dʒajpɸ	5. uʃtu
6. θtɜ	6. dɹɑ	6. dzɑzd	6. tʃɪpɸ
7. tsɝ	7. çcɪc	7. pɸɔj	7. ɑkxɑ
8. ɑpɸ	8. tɹaj	8. tsowst	8. dicçi
9. iθt	9. tʃɑdʒ	9. tʃɔɹt	9. ɑxkə
10. dðɑ	10. ists	10. ejθt	10. bɑʃt

6. *Drills in the Use of Modifying Signs*

A	B	C	D
1. hɑm	1. plejnz̥	1. hɛl	1. bow
2. mʌtʃ	2. mʌnəg̥	2. hɛɫ	2. b̥ow
3. hɑːm	3. t̬ajm	3. hil	3. pʰow
4. mʌrt͡ʃ	4. p̬ɑr	4. hiəɫ	4. cju

A

5. hɑəm
6. kɒt
7. pɪt͡ʃʒ̣
8. wɒ˧z
9. pɪtʃʒ̣
10. pɪ̣t͡ʃʒ

B

5. k̬ɔn
6. pʊɫ
7. pʊəɫ
8. pwʟ
9. puwəɫ
10. hæ˕t

C

5. t̪ɑ
6. d̡i
7. d̪ɑ
8. t̬i
9. kʰɛ˔t
10. fɜːrɪ

D

5. kɑbm̩
6. kʌtn̩pʰɑj
7. vɔːt
8. æpɪ̣ʃ
9. gow
10. pʰow

7. *Drills in the Attack and Release of Fricatives*

A

1. ɑnts
2. ɑns
3. hɛndz
4. hɛnz
5. risn̩
6. ristn̩
7. ristən
8. hɑrlθ
9. hɑrldθ
10. hɑrltθ

B

1. howlzsʌm
2. howlsəm
3. howltsəm
4. jʌŋkstɝ̣
5. jʌŋstɝ̣
6. jʌŋztə
7. si
8. tsi
9. t̬i
10. ist

C

1. mʌtʃ
2. mʌˀʃ
3. mʌʃ
4. bɒtlɪɲ
5. bɒklɪɲ
6. mɪst
7. ʃuʃt
8. skæsk
9. bɔtsən
10. bɔsən

8. *Nonsense Words*

A

1. fugɪ̣paj
2. θɔsbroip
3. ɑzdɛntsijə
4. fɑðtwɔr
5. fɑːmblɔj
6. ɑjθrʌb
7. zipulʌv
8. juwɑnəməs
9. ðɪbəræl
10. finəmɪ̣nt

B

1. bajdownə
2. rejlwɔrbz
3. fɔðdæp
4. tsidnɪɲ
5. wæ̣dʒɝg
6. ozɪ̣mæŋkʊ̣s
7. fowbrid̪ə
8. ɑbənɪtʃ
9. ɪdʒnɔɪk
10. zæksɪgd

C

1. dæsnisɪ̣k
2. tsɑjkɪ̣pɔ
3. ribəvɪdʒ
4. ħwizəlɪ
5. bɜnɑŋkθ
6. θɪʒɪ̣wʊg
7. sɑpdownɑj
8. ħjɑʒɝ̣
9. stræsks
10. ʃɛɲfuprɑ

D

1. ɔpɸɪç
2. cœnɪg
3. ɣowlwɛj

E

1. ʀ̌ɔʀ̌ʃtɔjg
2. vøbsɪ̣flɑdʒ
3. ʊxwɛɲ

F

1. dř̆ɛntθ
2. fɛɾək
3. d̪ebot̪ɛ

D

4. ɛwbɑx
5. bravijᴊ
6. æljɔŋjə
7. βæbinə
8. t̠ynɪ̣
9. ŋɑmpɸ
10. dzupf

E

4. fɜlɪðiɟ
5. flɑˀɫ̣
6. tɹɪpsʌjg
7. nowmbɛtɝ̣
8. ɪkstɜjm
9. æwdlɑəp
10. owβɔjθ

F

4. vuəɫɛjt
5. lɔjmnɑx
6. rœdnæk
7. tʃɔpzɑwɪ
8. frɒnəbɪ̣
9. kevejʃṇ
10. ɪrdɔznəvɛ

9. *Nonsense Sentences*

1. və zɔj ʃtɑdɑn zʊ bɜpɝ̣ ʒɛk
2. ɔj ʃɑ ʃrɛ zɪks ə zɔlɪɲ
3. ħrɑp ni θʊ zrɪp ɛŋ vɑj ɔjld ɪkʌtnɛk mwow
4. ul bə ħjɪrd zə skædʒ
5. pɸɔnrowbz ðiʒ bi ħwɪr ə rɪkɪ̣
6. ʃtælz θɪl own əmæbəlæ
7. hɪθ wu ɔbɝ̣ zɛn ə brin bɔkɪŋ
8. hɛ ʃʊk hæs βɑpɪ̣ swɔːd ṇ çɛm
9. rɛts vow du sə ifɔk pɑʃ
10. ɪˀɪzənt wejnɪŋ lɛjn nə ni
11. ɪtʃ jejnɪŋ zlɪdowfæd
12. zəθin bə mʌjt ṇ bʌjd
13. flɪθ dɪðə jajs zyd ʒɔx ħjʊlt
14. f·rə tʃɛk ðæk owŋ ʊ̣ pɑmpθɝ̣ kʁɔ
15. zə ʃkʊŋ ʒɑt zə ʃkʊn skʊm
16. jan ˀɪkɪ̣ ɔndjʊn fejðən ɔr æ̣ʃowm
17. wʌcị rɜdɪ̣ lɛŋk dʊ pɛjm
18. ʒæf wu nɪmpɪ ħwɑpɸ
19. ħrɑx zʊ kɔgkɜm kɔg
20. ɸə glɛojɪŋ ħwɝ̣g rʌjmbz ʃlejlɪ̣ ʌj ʒə çi

10. *Nonsense Verse*[1]

twɑz brɪlɪ̣g ænd͡ðə slɑjðɪ̣ towvz
dɪd d͡ʒɑjr ænd͡ʒɪmbɪ̣ ɪn ðə wejb
ɔl mɪmzɪ̣ wɝ̣ ðə bowrọgowvz
ænd͡ðə mowm ræðz ɑwtgrejb

---

[1] This most delightful piece of nonsense is from Lewis Carroll's *Through the Looking Glass.*

bɪ̣wæ˔r ðə dʒæbɝ̣wɒk mɑj sʌn
ðə dʒɔz ðætbɑjt ðə klɔz ðætkætʃ
bɪwæ˔r ðə dʒʊb dʒʊb bɝd ænd͡ʃʌn
ðə frumiəs bændɝ̣snæt͡ʃ

hi tʊk hɪz vɔrpɪ̣ sɔrd ɪn hænd
lɔŋ tɑjm ðə mæŋksəm fow hi sɔt
sow rɛstɪ̣d hi baj ðə tʌm tʌm tɹi
ænd͡stʊd əħwɑjl ɪn θɔt

ændæz ɪn ʌfɪ̣ʃ θɔt hi s͡tʊd
ðə dʒæbɝ̣wɒk wɪð ɑjz əv flejm
kejm ħwɪflɪŋ θru ðə tʌlgɪ̣ wʊd
ænd bɝbɪ̣d æz ɪt kejm

wʌntu wʌntu ænd͡ðru ænd͡ðru
ðə vɔrpɪ̣ blejd wɛnt snɪkɝ̣snæk
hi lɛft ɪt dɛd ænd wɪð ɪts hɛd
hi wɛnt gəlʌmpɸɪ̣ŋ bæk

ænd hæs͡tðɑw slejn ðə dʒæbɝ̣wɒk
kʌm tʊ mɑj ɑrmz mɑj bimɪ̣ʃ bɔj
ow fræbd͡ʒəs dej kæ̣lu kæ̣lej
hi tʃɔrtɪ̣d ɪn hɪz dʒɔj

Appendix C

Exercises

The following exercises are arranged under main subdivisions taken from the text. They are intended in part to serve as the basis for formal class assignments to be turned in by the students in written form. Others may well be used as the subjects of oral reports in class. Still others are designed to stimulate the student's thinking and to open avenues for personal observation and investigation, or perhaps to serve as subjects for term papers. The exercises described here will suggest others of a similar nature. The instructor and student should feel free to delete and supplement this material in accordance with individual interests and the scope and purpose of the class.

I. *The Phonetic Alphabet*

1. Read a paragraph of prose carefully. Note each sound unit and draw dividing lines between the letters of the alphabet in such a way as to mark off the separate speech sounds. Consult the *Table of Phonetic Symbols* and write the proper symbols above the line, thus:

ð izwimej prapɝlɪ kɔlspi tʃsawn
"Th/e/se/w/e/m/a/y/p/r/o/p/er/l/y/c/a/ll/s/p/ee/ch/s/o/u/n/
dz
d/s/."

Do you find some sounds that are not represented in the spelling? Do you find letters that have no sound? Are there times when two letters have only one sound, or one letter has two sounds? What evidence of the value of, or the need for, a phonetic alphabet do you see in this exercise?

2. Observe a child 18 months to three years of age, and try to transcribe his repertory of sounds. Do you notice some that are not standard sounds in English speech? How do you account for the eventual disappearance of these sounds from the child's sound system and for the difficulty of relearning them at a later date?

3. Invent new sound units for use in American speech. Make up

symbols for these sounds. Do these symbols meet the requirements set down in the text? Give reasons why these sounds should or should not be added to the English sound system.

4. Explain the pronunciation of the letter *e* (or *a* or *i*, etc.). The introductory material in a large dictionary will be your best source of information. Write out the explanation once using phonetic symbols and again without the aid of such symbols.

5. Have a friend (preferably a foreigner) read slowly a page or two of a foreign language with which you are unfamiliar. Try to pick out the sound units of the language. Use the symbols you have already learned for those sounds that are familiar and devise new symbols for those that are not. If possible, check your findings with someone who knows the sound system of the language. Watch for sounds that vary slightly from the corresponding English phonemes.

II. *Basic Principles of Phonetics*

1. Choose one or two of the following sounds for observation: [ɑw], [ɑj], [ɔ], [ɑ] or [ɛ]. Make a list of 10 or more words containing the sound. Select 10 people who were born and reared in the same state and study the differences in their pronunciations of the sound under observation. If you find variations, try to account for their presence. Does the pronunciation of the sound seem to be influenced by neighboring sounds?

2. Repeat Exercise 1 above, this time studying individuals from various states or sections of the country. Discuss your findings.

3. Select a group of about 10 people. These individuals may be drawn from the same section of the country and represent a homogeneous speech environment; they may be selected from different sections of the country in such a way as to give a sampling of different speech environments, or they may be made up of representatives of various foreign dialects. Study the way in which they pronounce the *r* sounds in the following sentence: "Early one winter morning, he left his farm and wandered far and wide in search of fur bearing animals, particularly deer and bear." What variations do you observe? How do you account for them?

4. Study the way in which 10 or more individuals make the *s* sound. You will probably find variations. How do you account for them? Compare the causes for variation in the *s* sound with the causes for any variations you may have observed in Exercises 1, 2 and 3 above.

5. Using the phonetic alphabet, given in the early pages of this text, determine by observing a friend, or by watching your own articulation in a mirror, the sounds that are capable of analysis by direct observation. List each of the sounds of English speech under one of the following groups: (1) easily observable, (2) partially observable and (3) practically unobservable. Be sure to keep your pronunciation normal.

6. Practice making the various speech sounds paying special attention to the sensations arising from contacts made within the articulatory mechanism and from movements of the mechanism. Place each sound in one of two groups: (1) sounds accompanied by rather definite sensations, and (2) sounds lacking such specific sensations. What conclusions would you draw about the relative stability of the sounds in these two groups? Are these inferences borne out in fact? What is the bearing of this exercise on the teaching of the deaf? What implications does it have for the speech clinician who is teaching new sounds to speech defectives?

7. If time and materials are available, several students should make, or have made by a dentist, artificial plates for the hard palate and practice making palatograms and linguagrams. Note the points of contact for the various sounds and the variations in two palatograms of the same sound. Study the effect of the preceding and following vowels. Make a list of the sounds that cannot be studied from palatograms. Drawings or photographs of typical palatograms and linguagrams of all of the sounds analyzable by this method would make excellent material for a term paper in phonetics.

III. *The Speech Mechanism*

1. Study models and charts of the speech mechanism until you are familiar with the structures and with their functions in speech. Time spent in acquiring a detailed knowledge of the speech mechanism will yield rich dividends in the study of phonetics.

2. If possible, arrange a demonstration laryngoscopic examination. Have the patient demonstrate the positions of the glottis for ordinary breathing, whispering, the *h* approach, the glottal stop approach, and the glottal vibratory approach. Write up your observations.

3. Observe the effects of emotional conditions upon speech. What aspects of speech are most affected? What emotions or feelings disturb articulation the most? Observe an actor's simulation of some of these emotions. Does his speech reflect a true-to-life reaction to the emotion?

4. If an artificial larynx and a bellows are available, practice speaking with it until you become reasonably adept. What sounds are difficult to produce with the artificial larynx? Why? What sounds are easy? What sounds or approximations of sounds could you make without the aid of any artificial appliance if there were no moving column of air to be used for speech?

5. If a recording machine and a contact microphone are available, make a recording of continuous speech with the microphone placed successively upon the subject's chest, larynx, mandible, maxilla, nose, forehead, top of the head and back of the neck. Write up your observations, noting especially the effect of the position of the microphone on resonance and understandability. With the contact microphone on the thyroid cartilage, record such sound combinations as [pɑ], [tɑ], [kɑ], [sɑ], [fɑ], [ʃɑ], etc. Could you identify the consonants when the record was played? Why?

6. Examine the articulatory mechanisms of five people, observing similarities and differences. Devise simple tests for speed of tongue, lip, and jaw movement and try them out on your subjects. Do you find differences in their ability to make such movements? If so, how do you account for them?

IV. *Kinesiologic Phonetics*

1. Practice making such sounds as [s], [ʒ], [ʊ], [ɑ], [i], [ej], [rɑ], etc. until you have developed an accurate sense of feeling of the nature of the sounds, i.e., continuant, stop-plosive or glide.

2. With a stethoscope or a contact microphone or with the fingers placed on the thyroid cartilage, compare voiced and voiceless pairs of sounds until you can distinguish them easily.

3. Arrange all of the sounds of English in order from the least sonorous to the most sonorous. What use could you make of this list in speech correction? In public speaking or interpretation?

4. Arrange all of the vowels, English and foreign, according to their nearness to each other acoustically. How many of these vowels could be used as phonemes in one language without giving rise to confusion? Are there any vowels that could be added to the English sound system? Are there any vowels in English that should be discarded to avoid confusion? Construct an "ideal" vowel system for a language.

5. Select three or more of the vowel sounds of English for study.

List as many as possible of the ways in which each of these vowels is spelled.

6. Prepare a list of 10 words containing two or more unaccented syllables. Analyze the pronunciation of this list of words by 10 or more individuals, with particular reference to their handling of the vowels in the unstressed syllables. If possible, include subjects from different sections of the country. Tabulate your results.

7. Make your own measurements of the distance of the jaw opening in the production of the various vowels. Do you observe much variation? Did you notice any differences between good and bad speakers in this respect?

8. Find 10 examples of the use of the glottal stop [ʔ] in normal speech. If you have an opportunity to observe speech defectives, note the types of defects that are characterized by the use of the glottal stop. If such observation is not possible, what types of speech defects would you expect to be characterized by the use of the glottal stop?

9. Arrange all of the consonant sounds, English and foreign, in the order of their nearness to each other acoustically. Cross out those that could not be used as phonemes in one language without confusion. Are there any consonants that could be used as phonemes in English in addition to those already in the language? Are there any now used in English that should be discarded to avoid confusion? Construct an "ideal" consonant system for a language.

10. List words and phrases showing as many different forms of the explosive phase of [t] (or any other plosive) as possible. Examples: *cat-tail*, *catnip*, *ketchup*.

11. The various members of the *r* phoneme do not at present have separate phonemic significance. Arrange these various *r*'s in order according to their tongue position and circle those you think could be used as separate phonemes. Test your judgment by making nonsense words that are alike except for the type of *r* used. If other people can readily distinguish one such nonsense word from another, it may be assumed that each word could carry a different meaning and that the respective *r*'s could serve as separate phonemes. Do not let the listener watch your pronunciation of the test words. If you find that some of these *r*'s could serve as separate phonemes, why are they not so used at present? Or are they?

12. Pronounce in random order the combinations [mɑ], [ɱɑ], [nɑ], [ɳɑ], [n̪ɑ], [ɲɑ] and [ŋɑ] to various subjects and study their ability to

discriminate the nasal sounds. Draw such conclusions as the evidence warrants.

13. List one word or phrase, if possible, exemplifying each of the affricate combinations.

14. Let the members of the class transcribe separately or in pairs the same selection of recorded speech. Play the record as often as necessary for accurate hearing of the sounds. Compare the transcriptions in class, keeping the record available for use in clearing up disputed transcriptions. This exercise can be repeated profitably a number of times using recordings of increasing difficulty and of different types of speech. Students will find it profitable to study carefully commercial or home-made records of various types of speech. If these are not available, study the speech of radio announcers and performers or of public speakers. The habit of jotting down in phonetic symbols unusual pronunciations wherever they are heard can become an interesting pastime.

V. *The Phenomena of Dynamic Phonetics*

1. Find 20 examples of transition sounds such as those occurring in *fence* and *something.*

2. Read a short paragraph and count the number of full stops in articulation, the number of pauses in position and the number of glides. What is the relative frequency of these three aspects of articulation?

3. With a stop watch determine the time it takes to speak normally a short passage of prose. Compute the number of speech sounds produced per second. How many gross movements did the tongue make? How many times did the articulatory mechanism come to the full stop? How often did the vocal folds open and close? How many times did the soft palate open and close? Comment on your findings.

4. Make a study of the carryover of nasality from nasal sounds to preceding or following vowels. Explain why this happens and how it is to be avoided.

5. Prepare words and short phrases for recording. Write in phonetic symbols how you think these phrases will sound when heard in reverse. Check your judgment by playing the record backwards. Try to work out some combinations for recording that will sound the same whether the record is played forward or backward.

6. Pronounce the following isolated sounds: [ɪ], [ɛ], [æ], [ʊ], [ej], [ɑw], [b], [p], [ʒ], and [ʃ]. Now pronounce the same sounds in words. What differences do you observe?

7. Describe what happens to the separate sounds in the phrase, *up and at them* [ʌpændætʼðɛm] when these words are pronounced rapidly. A four year old child recognized immediately [ʌʔəʔæʔm̩] as the above phrase. Write in phonetic symbols the degree of slurring you would consider permissible in good speech. What problems arise in making such a decision.

8. Learn to say: [sɛːt], [hæːp], [bɒːks], [tʌːk], [bʊːk], [bʟːk]; also, using a shortened vowel, say [sit], [bet], [kæt], [klæk], [tɝk], [sup]. Pronounce the following words, then repeat them omitting the final sound, but preserving the incidental connecting sounds: [hæv], [hæz], [liɡ], [liv], [bɪɡ], [bɪd], [ræŋ], [ræn], [bɪŋ], [bɪm]. Pronounce the following words, omitting the "off-glide" following the final plosive: *bag*, *head*, *cob*, *leak*, *bet*, *peep*. Which words are the ones whose pronunciation is most altered from that usually given them? Pronounce, in the same manner, *seep*, *seek*, *seat*. Do these words sound alike? Could a hearer distinguish one from another? How? Utter a slow glide beginning with [i] and ending with [ɑ]. Time it with a watch having a second hand. How short an utterance can you manage without producing the effect of [jɑ]? Try this experiment also with a glide from [u] to [ɑ], comparing such a glide with [wɑ]. Pronounce [ŋɑ] to a friend not phonetically trained and ask him to spell it. Explain his spelling. Try also [ɑlŋ], [ɝŋ], and [ŋi].

9. Pronounce in reverse *house*, *cautious*, *saying*, *when*, *wen*. What happens to the [h] in *house?* What is difficult about the reversal of the *c* in *cautious*? Why is it difficult to distinguish in reverse between *when* and *wen?* Whisper [ɑw] and [hɑw]. How do you produce the distinguishing characteristics of these two whispered words?

VI. *Phonetic Metamorphology*

1. Find ten examples of interchangings of sounds of the beta group. It is not necessary that the interchangings be between the same pairs of sounds and in the same direction, as in the illustrations given in the text. Find ten examples of delta interchangings. Find ten examples of gamma interchangings.

2. Find ten examples of interchangings among front vowels, ten among back vowels, and ten among mid vowels.

3. Find five examples of horizontal interchangings among the vowels and five of interchangings between centrally delivered and laterally delivered vowels.

4. Find ten examples of gamma-to-delta migration of sounds.

5. Find ten examples of ablaut verbs, employing at least five different vowels in their present tense forms. Find five reduplicative, ablaut, vocables, and also five reduplicatives that have consonant changes only.

6. Find pairs of words in which strong, definite, stressed vowels are compared with parallel schwa forms. Find one pair like each of the samples given in the text.

7. Find five pairs of words in each of which a [tj] combination is palatalized in one word and not in the other. The words of each pair need not necessarily be related philologically but should exhibit similar approaches to and releases from the [tʃ] and the [tj]. Find also five similar pairs illustrative of the palatalization of [dj]. Find also five pairs of words in which [j] has changed to [dʒ], or in which we have two parallel forms one pronounced [j] and one [dʒ], as *yoke* and *joint.*

8. Find ten examples of sound changes due to combinations of word-units that bring into juxtaposition incompatible sounds.

9. Find ten examples of sound changes (not merely omissions) that are due to the operation of the principle of articulatory economy.

10. Find ten examples of word pairs in each of which a vowel appears as a glide in one word and as a pure vowel in the other because of a difference in the consonants that follow the vowels. The words of a given pair need not be related philologically but should have similar approaches to the vowel and similar releases from the consonant. Find ten examples of a change from a glide vowel to a pure one through a change in stress.

11. Find ten examples illustrative of changes of timing of the laryngeal movements. Find also ten examples showing changes of timing of the velar movements. Find also ten examples of changes of timing of the articulatory series.

12.[1] Find ten examples of "accidental" unaspirated plosives with voiceless implosion. Find also ten examples of unaspirated, voiceless plosives initiating unstressed syllables. Find also ten examples of unaspirated, voiceless plosives initiated by [s]. Find ten examples of definite aspiration preceding voiceless fricatives.

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[1] In working out exercises 12 and 13 the following procedure is helpful: Take a piece of rubber tubing of small diameter, about 12 inches long. Hold one end of the tubing in the opening of the meatus of the ear and the other in front of the lips. One will thus be able to note clearly the periods of aspiration.

13. Find five examples each for the following categories of fortis and lenis effects:

1. aspirated, stressed consonants.
2. aspirated, unstressed consonants.
3. unaspirated, stressed consonants.
4. unaspirated, unstressed consonants.

14. Find five examples of change of attack upon fricatives, from "open" to "closed" or from "closed" to "open."

VII. *American Speech Styles*

1. Find five words, using as many different vowels, that are pronounced in your locality with vowel glides, in spite of the fact that they are marked in the dictionary to be pronounced with pure vowels. Indicate the glide that is used.

2. Find ten examples of unstable diphthongs like that in *Mary*, which may be [ɛr], [ær], [er], or [ejr].

3. List the five words in which you consider the use of the compromise [a] is most justifiable. Make similar lists for [ɒ] and [ɜ].

4. Do you use "schwas" for the italicized vowels in the words that follow: inf*a*nt, nov*e*l, c*o*ntrol, ev*i*l, cab*i*n? Write phonetically your ordinary pronunciation of each. Compare your pronunciations with those given in your favorite pronouncing dictionary. If your use differs from that given in the dictionary, how do you reconcile the difference? Or don't you?

5. Take the tubi*ng* you used i*n* Exercises twelve and thirtee*n* above. This ti*m*e put o*n*e e*n*d i*n* your ear a*n*d the other just i*n* the e*n*tra*n*ce of the *n*ostril. Read orally the directio*n*s for this exercise. You should hear a clear to*n*e through the tubi*ng* o*n* all the italicized sou*n*ds. If you hear clear to*n*es o*n* other sou*n*ds, you are "*n*asalizi*ng*." Practice the readi*ng* u*n*til you ca*n* avoid such *n*asalizatio*n* or u*n*til you have deter*min*ed that such avoida*n*ce is i*m*possible for you.

6. Compare your habitual pronunciation of the following words with that given in your favorite dictionary, paying special attention to the stress marks: *prisoner*, *capillary*, *secondary*, *government*, *memory*, *wondering*, *preference*, *ice-cream*, *cow-boy*. Justify your own usage, if possible.

7. If you could by fiat fix a style of pronunciation of English for all cultured Americans, indicate what changes you would make from the

form illustrated by the transcription at the close of Chapter 17. Justify your changes.

VIII. *The Pronouncing Dictionary*

1. Construct a table of equivalent phonetic values, taking your own pronouncing dictionary as a basis. Make your table in three columns: (1) the dictionary symbol, (2) the key word or words, (3) the phonetic symbol. Such a table will constitute the opposite aspect of the table given in the text in Chapter 19. There is displayed the dictionary equivalents of phonetic symbols. What you are to do is to display the phonetic equivalents of dictionary symbols.

IX. *Applied Phonetics*

1. If you could hear only the fundamental tones of the human voice—not the harmonics and the friction noises—what would you hear when one asked you, "How far is it to Chicago?" Write it phonetically. Now write what you would hear if you could hear all but the friction noises of speech. What are the homophenes of *bat*, *come*, and *red*?

2. Analyze the speech of some person whose first language was not English. Write a few sentences of the dialect in phonograms. Judging from the phonetic lapses in the dialect, construct the sound system of the subject's native or childhood language; then check your guesses by having him give you samples from that language.

3. Show how you might teach an individual each of the following sounds by making certain modifications of sounds present in the English sound system: [ħw], [ɪ], [ɝ], [ç] and [ʁ].

4. Describe the methods you would use in teaching a deaf person the following sounds: [d], [p], [ɑ], [k] and [w]. How would you teach the same sounds to a blind person?

5. Describe the placement and manner of production of the following sounds in enough detail so that someone who does not speak English might read your description and produce the sounds with reasonable accuracy: [ħj], [u], [f], [tʃ] and [ŋ].

6.[2] Plan the procedure and prepare the materials for teaching the sounds [θ], [ð], [r], [l], and [s] to a first grade class.

7. Plan the procedure and prepare the materials for correcting the following sound substitutions in small children: [θ] for [s], [w] for [r], and [f] for [θ].

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[2] Exercises such as 6 and 7 can be made up in as great a number as necessary to meet the special needs of those interested in the use of phonetics in the public schools.

Appendix D

English as Spoken, Forty-three Samples

The following transcriptions are included primarily for use as practice material in the reading of phonetic symbols. The student should develop the ability to read phonetic transcription easily and accurately. This ability is based upon a thorough knowledge of the sound values of the phonetic symbols and the various modifying signs. Fluency in the reading of transcription is gained only by constant practice. Additional material for practice may be found in certain of the books presented in the Annotated Bibliography. The reader should take care to note each symbol and give it its exact value. He is cautioned to avoid the error of pronouncing in his own habitual manner after having grasped just enough of a word to recognize it. The many varieties of speech represented below make such procedure especially inaccurate.

These transcriptions have an important secondary value in that they present samples of the speech of forty-three individuals representing various ages, social strata, nationalities, and sections of the country. They were made by the authors in personal interviews with the subjects. As the subjects read from one copy of the material, their pronunciation was recorded as accurately as possible upon a second copy. The transcriptions represent slow and careful reading without any previous practice. Whenever necessary the subject was asked to repeat until the examiner could be reasonably certain of the pronunciation. Most of the subjects realized that their speech was being transcribed. They were urged, however, to use as nearly as possible their habitual pronunciation. The sole concern of the authors was to transcribe faithfully exactly what the subject said. If some of the transcriptions seem unreasonable, it is nevertheless to be assumed—barring the possibility of a typographical error—that the subject actually pronounced the word in the manner indicated. The symbolization is that used in the body of this book. In general, the first part of this material is in broad transcription and the latter portions in a more narrow form.[1] There are, of course, limits to the accuracy of phonetic symbolization. The finer variations of speech sounds cannot be transcribed even with the most elaborate of systems. The present transcriptions indicate pronunciation only. No attempt has been made to describe pitch and voice quality or to represent intonation patterns. In those instances where the subject's pronunciation of a word was so distorted as to make it unrecognizable, the intended word is given in parenthesis following the transcription. All capitalization, punctuation, and paragraph division is omitted in the transcribed material. Instead, a single bar is used to separate thought groups and a double bar to indicate the end of a sentence. A brief biography of the subject precedes each transcription.

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[1] The reader should not be confused by apparent inconsistencies arising when similar or identical words and phrases are written in broad transcription in one

It should be understood that these transcriptions are not intended as samples of any particular kind of speech. No one should make the mistake of generalization and assume that a given sample is repre-

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place and in a narrow form in another. For example, the word *king* may appear as [kɪŋ] and also as [cɪɲ]. The suffix *ing* is usually written [ɪ̣ŋ] but often appears as [ɪ̣ɲ]. Similarly, *what* may be written [hwɑt] in one instance and [ħwɑt] in another, and *begin* may be written both as [bɪ̣gɪn] and [bɪ̣ɟɪn]. Likewise, while [ɑw] and [ɑj] are broad transcriptions of these two glides, other narrower forms such as [ɑʊ], [aʊ], [æʊ], etc. or [aɪ], [æɪ], and [ɑᵊ] etc. are used to indicate fine differences in pronunciation. These differences in transcription are not to be regarded as inconsistencies or errors. Each is justifiable. Since the primary purpose of this appendix is to provide material for practice in the recognition and pronunciation of phonetic symbols, both narrow and broad forms have been used and in some instances interspersed. Narrow transcription is used here to serve two purposes, namely, to highlight important principles in phonetics and to indicate fine differences in pronunciation. Thus [kɪŋ] represents about the same pronunciation as [cɪɲ]. The symbols [c] and [ɲ] serve merely to call attention to the fact that these sounds are fronted when they are associated with a front vowel. On the other hand, [t̪] represents a sound different in some aspects from [t], and [æʊ] represents a special variety of the [ɑw] glide. It should be noted that some of the pronunciations that seem improbable or even impossible undoubtedly represent slips of the tongue such as occur with nearly all speakers. Special attention should be called to the use of the modifying sign for dentality, [̪]. In the transcriptions of certain foreign accents, *t*'s and *d*'s are sometimes marked as dental and sometimes not. There is always a possibility that the speech of these individuals has been influenced by English to the extent that some of the *t*'s and *d*'s are no longer dental. *Anatomically*, all of these sounds were probably made dentally. *Acoustically*, however, some of them seemed to the observer to be dental and others more like the English variety. The former are marked with the modifier [̪]. In one section the *th* in *the* is transcribed variously as [d̪], [ð̪] and [d̪͡ð]. This again is an attempt on the part of the observer to represent acoustic variations in a sound as heard in actual speech. The reader should remember also that frequently only a portion of the word or sentence is written in narrow transcription with modifying signs in order to illustrate some particular pronunciation, while the remainder is in broad transcription.

sentative of any particular age-level, social stratum, nationality, or section of the country. Such was not the intention of the authors. The samples represent, rather, the speech of certain individuals who were chosen because their pronunciation showed interesting characteristics and illustrated many different ways of speaking the English language. If they seem to be typical (or atypical) of any particular group, it is entirely by accident and not by design. The authors have purposively refrained from labeling the samples as good or bad speech or as representing any particular dialect or section of the country. The reader may draw his own conclusions. Within the limits of the error imposed by the nature of phonetic transcription, these samples must stand as *individual examples* of English *as it is actually spoken.*

1. This subject, aged 24, was born and reared in Parkersburg, West Virginia. Her parents were natives of that section. She attended Ohio University and taught four years in the Parkersburg Junior High School. She has traveled a little but has never lived outside of West Virginia except for her college years.

rɪp væn wɪnkḷ
baj wɔʃɪ̣ŋtən ɝvɪ̣ŋ

huɛvɚ̣ hæz mejd ə vɔjdʒ əp ðə hʌdsṇ| mʌs rɪ̣mɛmbɚ̣ ðə kætskɪl mæwntṇz|| ðej ɑr ə dɪsmɛmbɚ̣d bræntʃ əv ðə grejt æpəlejtʃṇ fæmlɪ̣| æn ɑr sin əwɛɪ tʊ̣ ðə wɛst əv ðə rɪvɚ̣| swɛlɪ̣ŋ ʌp tʊ̣ ə nɛobḷ hajt| æn lɔrdɪ̣ŋ ɪt owvɚ̣ ðə sɝrawndɪ̣ŋ kʌntrɪ̣|| ɛvrɪ̣ tʃejndʒ əv sizən| ɛvrɪ̣ tʃejndʒ əv wɛðɚ̣| ɪndid ɛvrɪ̣ awr əv ðə dej| prədɪusɪ̣s sʌm tʃejndʒ ɪ̣n ðə mædʒəkḷ huz æn ʃejps əv ðiz mæwntṇz| æn ðej ɑr rɪ̣gɑrdəd bɑj ɔl ðə gʊd wɑvz| fɑr ṇ nɪr| æz pɝfɪ̣k bərɑmətɚ̣z|| wɛn ðə wɛðɚ̣ ɪz fɛr ṇ sɛtḷd| ðej ɑr klɛᵒðd ɪn blu ṇ pɝpḷ| æn prɪnt ðɛr bowld awtlajnz ɑn ðə klɪr ivnɪ̣ŋ skaj| bʌt sʌmtajmz hwɛn ðə rɛs əv ðə lænskejp ɪz klawdlɪ̣s| ðej wɪl gɛðɚ̣ ə hʊd əv vejpɚ̣z əbawt ðɛr sʌmət| wɪtʃ ṇ ðə læs rejz əv ðə sɛtɪ̣ŋ sʌn| wɪl glɛᵒ æn lajt ʌp laʲk ə kræwn əv glowrɪ̣||

2. This boy, aged 11, was born in Phillipi, West Virginia. When he was seven his parents—both native West Virginians—moved to Athens, Ohio, where he has lived for the last four years. His father is an office worker.

æt ði fʊt ʌv ðiz fɛrɪ̣ mæwntṇz| ðə vɔjədʒɚ̣ mej hæv dɪ̣skrɑjd ði lɑjt smowk kɝlɪ̣ŋ ʌp frʌm ej vɪlɪ̣dʒ| huz ʃɪŋgḷ rʊfs glim əmʌŋ ðə triz| dʒʌst hwɛr ði blu tɛ˔nts əv ði ʌplæn mɛlt͜əwej ɪntu ði frɛʃ grin əv ði nɪrɝ̣ lændskejp‖ ɪt ɪz ej lɪtl̩ vɪlịdʒ ʌv grejt æntɪkwətị| hævịŋ bɪn fæwndəd bɑj sʌm əv ði dʌtʃ kɑlənɪsts| in ði ɝlị tajmz əv ði prɑvɪnts| dʒʌst ẹbɑwt ði bịgɪnịŋ ʌv ði gʌvɝ̣mənt ʌv ði gʊd pitɝ̣ stajvəsənt| mej hi rɛst ɪn pis| ænd ðɛr wɝ sʌm əv ði hæwzɪz əv ði ərɪgənl̩ sɛtlɝ̣z stændịŋ wɪθɪn ej fju jɪrz| bɪlt frʌm smɔl jɛlow brɪks brɔt frəm hɒlənd| hævịŋ lætịst wɪndowz æn gejbl̩ frʌnts| sɝmæwntịd wɪθ wɛðɝ̣ kɑks‖

3. This subject is a man, aged about 28, who has lived all of his life in Athens, Ohio, except for five years in California between the ages of 20 and 25. He attended Ohio University and is at present a graduate student in speech in that institution. He has traveled considerably in this country.

ṇ ðæt sejm vɪlịdʒ| æn ṇ wʌn əv ðiz vɛrị hawzịz| hwɪtʃ tụ tɛl ðə prəsɑjz truθ| wəz̥ sædlị tɑjmworn æn wɛðɝ̣ bitṇ| ðɛr lɪvd mɛnị jɪrz sɪnts| hwɛn ðə kʌntrị wəz jɛt ə prɑvɪns əv grejt brɪtṇ ej sɪmpl̩ gʊd nejtʃɝ̣d fɛlow| əv ðə nejm əv rɪp væn wɪnkl̩‖ hi wəz ə dəsɛndənt əv ðə rɪp væn winkl̩ hu fɪgjɝ̣d sow gæləntlị ɪn ðə ʃɪvəlrəs dejz əv pitɝ̣ stajvəsənt| æn æ̣kʌmpnịd hɪm tụ ðə sidʒ əv fort krɪstinə‖ hi ɪnhɛrətịd hɑwɛvɝ̣ bət lɪtl̩ əv ðə mɑrʃəl kɛræ̣ktɝ̣ əv hɪz ænsɛstɝ̣z‖ ɑj hæv əbz̥ɝvd ðæt hi wəz ẹ sɪmpl̩ gʊd nejtʃɝ̣d man| hi wʌz morowvɝ̣ ej kɑjnd nejbɝ̣| æn æn ọbidịənt hɛnpɛkt hʌzbənd‖ ɪndid tụ ðə lætɝ̣ sɝ̣kəmstænts majt bị owịŋ ðæt miknịz əv spɪrət hwɪtʃ gejnd ịm sʌtʃ junəvɝsəl pɑpjulɛrətị| fọr ðowz mɛn ɑr mowst æpt tụ bi ɑbsɪkwịəs æn kɑ̣nsɪlịejtịŋ əbrɔd| hu ɑr ʌndɝ̣ ðə dɪsəp̣lɪn əv ʃruz ət howm‖

4. This subject, aged about 35 years, was born in Russia of an English mother who died when the subject was five years old. However, English was not spoken in her childhood home. At the age of three she was taken to Berlin where she lived for six years. By the age of nine she spoke Russian, French, and German. Between the ages of nine and twelve, she lived in Holland and learned the Dutch language. The following seven years were spent in Germany where she studied Latin each year and British English for five years. She lived in Greece for the next two and one-half years and learned to speak Greek. At the age of 27 she migrated to the United States and, after two years in Ithaca, New York, moved to Oxford, Ohio, where she is now living.

ðɛr tɛmpəz dɑwtləs ɑː rɛndəd plɑjənt æn mæljəbl̩ ɪn ðə fɑjrị fɝnịs əv dọmɛstịk trɪbjulejʃən æn ə kɜtṇ lɛktʃə ɪs wɜθ ɔl ðə sɜmənz ɪn ðə wɜld fɔr titʃịŋ ðə vɜtʃụz əv pejʃəṇs æn lɔŋ sʌfrịŋ‖ ə tɝməgənt wɑjf mej| ðɛᵊfowr ịn sʌm rịspɛks| bi kʌnsɪdɝ̣d ə tɑlɝ̣əbl̩ blɛsịŋ| æn ɪf sow rɪp vən wɪnkḷ wəz θrɑjs blɛst‖ sɜtɪ̣n ɪ̣t ɪz ðæt hị wəz ẹ grejt fejvərət əmʌŋ ɔl ðə gʊd wɑjvz əv ðə vɪlị̣dʒ| hʊ æz juʒuəl wɪð ðị ejmɪ̣əbḷ sɛks| tʊk ɪ̣z pɑrt ɪ̣n ɔl fæmlị skwɑbḷz æn nɛvɚ̣ fejld| hwɛnɛvɚ̣ ðej tɔkt ðowz mætɚ̣z owvɚ̣ ɪn ðɛr ivnɪ̣ŋ gɒsɪ̣pɪŋ| tu ɫej ɒl ʌv ðə blejm ɑn dejm væn wɪnkḷ‖ ðɪ̣ tʃɪldrən əv ðə vɪlị̣dʒ tu| wʊd ʃɑwt wɪð dʒɔj hwɛnɛvɚ̣ hị əprowtʃt‖

5. This subject, aged 23, was born in Madison, Wisconsin. He has lived most of his life in various small Wisconsin cities. His mother was formerly a teacher of English, and his father has been a city superintendent of schools for over 25 years. He is now a half-time instructor in speech in a small college in Ohio.

hi əsɪstəd æt͡ðɛr spoərts| mejd ðɛr plejðɪŋz| tɔt ðɛm tə flɑj kɑjts ænd ʃut mærbḷz| æn tol ðẹm lɔŋ stoərịz əv gosts| wɪt͡ʃəz æ̣n ɪndɪ̣jənz‖ hwɛnɛvɚ̣ hị wɛnt dɑd͡ʒɪŋ əbɑut ðə vɪlɛ̣d͡ʒ| hi wʊz sɚ̣rɑundəd bɑj ə trup əv ðɛm hæŋɪ̣ŋ ɑ̣n hɪz skɜts| klæmɚ̣ɪŋ ɑ̣n hɪ̣z bak æn plejɪ̣ŋ ə ðɑusənd trɪks ɑ̣n hɪm wɪ̣ð ɪ̣mpjunɪ̣tɪ̣| æn⁀nɑt ə dɔg wʊ̣d bɑrk æt hɪm ðruɑwt ðə nejbɚ̣hʊd‖ ðə gret ɛrɚ̣ ɪ̣n rɪps kɑmpəzɪ̣ʃən wʊz æn⁀ɪ̣nsupɜəbḷ əvɜʒən tụ ɔl kɑjndz əv prɑfɪ̣təbḷ lejbɚ̣‖ ɪt kʊ̣d not bi frəm wɑnt əv əsɪdʒuɪ̣tị or pɜsərvirəns| fọr hi wʊ̣d sɪt ɔl dej ɑ̣n ə wɛt rɑk| wɪð ə rɑd əz hɛvị æz ə tɑrtɚ̣z læns ænd fɪʃ ɔl dej wɪ̣ðɑut ə mɜmɚ̣| ivṇ ðọ hi ʃʊ̣d nɔt bi ənkɜəd͡ʒd bɑj ə singḷ nɪbḷ‖

6. This subject, aged 23, was born in Washington, D. C., but when she was 18 months old, her family moved to Indianapolis, where she lived until she was 10. After that she lived in Chicago for a year and a half before moving to Crawfordsville, Indiana, where she is now residing. She is an instructor in economics.

hi wʊd kɛrị ə fɑwlɪ̣ŋ pis ɑn hɪz ʃoldɚ̣ foər ɑwẹrz ðəgɛðɚ̣| trʌd͡ʒɪ̣ŋ ðru ðə wʊdz ṇ swɑmps| æn ʌp hɪl ænd⁀dɑwn dejl| tụ ʃut ə fjɪ̣u skwɜrḷz or wɑjld pɪd͡ʒənz| hi wʊd nɛvɚ̣ rɪ̣fjuz tu əsɪst ə nejbẹr ivṇ ɪn ðə rʌfəst⁀tojl| ænd wʊz ə fọrmost mæn æt ɔl kʌntrị frɑlịks fọr hʌskɪŋ ɪndɪ̣jən koərn| or bɪldɪ̣ŋ ston fɛnsəz| ðə wɪmɪ̣n əv ðə vɪlị̣dʒ tu| juzd tu ɛmploj hɪm tụ rʌn ðɛər ɛrəndz| ænd tụ du sʌtʃ lɪtḷ ɑd dʒɑbz az ðɛər lɛs əbḷɑjdʒɪ̣ŋ hʌsbəndz wʊd nɑt du for ðɛm‖ ɪ̣n ə wɜd rɪp wʊz rɛdị tụ ətɛn⁀tụ ɛnɪ̣bədịz bɪznəs bət hɪz own| bʌt æz tu duɪŋ famlị djutị| ænd kipɪ̣ŋ hɪz fɑrm ɪ̣n ordɚ̣| hi fɑwnd ɪt ɪ̣mpɑsɪbḷ‖

7. This subject, aged 29, was born in Chicago and lived there for 20 years. Since then he has spent three years in Crawfordsville, Indiana,

three years in Chicago as a factory-hand, and three years in Madison, Wisconsin. He spoke only Swedish until he was four years old and still speaks the language fluently. His mother came from the Aaland Islands (Swedish) where Finnish is also spoken. In addition to Swedish and Finnish, the mother "speaks also German." The subject is now a teacher of political science.

ɪn fækt hi diklɛrd ɪt wəz əv no jus tʊ̣ wɝk ɑ̣n hɪz fɑrm| ɪt wəz ðə mos pɛstɪ̣lənt pis əv grɑwnd ɪ̣n ðə hol kəntri| ɛvrɪ̣ðɪ̣ŋ əbɑut ɪt wɛnt rɔŋ an wʊd gọ rɔŋ ɪn spajt əv hɪm|| hɪz fɛnsəz wɝ kəntɪnjụəlɪ̣ fɔlɪ̣ŋ tụ pisəz| hɪz kɑwʊ̣d iðɚ̣ go əstrej| ɚ̣ gɛt əmʌŋ ðə kæbəd͡ʒz| widz wɝ ʃəɝ tụ grow kwɪkɚ̣ ɪn hɪ̣z fijḷdz ðæn ɛnɪ̣hwɛr ɛls| ðe rejn ɔlwẹjz mejd ə pojnt əv sɛtɪ̣ŋ ɪn d͡ʒəst hwẹn hi hæd səm ɑwtdọr wɛrk tə du| sọ ðæt ðo hɪz pạtrɪ̣monɪ̣əl əstejt hæd⁀dwɪndḷd əwej ʌndɝ hɪz manəd͡ʒmənt ɛkɝ bɑj ɛkɝ| əntɪl ðɛr wəz lɪtḷ mor lɛft ðan ə mɪ̣ɛr patʃ əv ɪndɪ̣ən koərn an pətetoz| jet ɪt wəz ðə wɛrst kəndɪʃənd farm ɪ̣n ðə nejbɝhʊd||

8. This subject, aged 26, was born in St. Charles, Illinois, where she lived until she was 17. Since then she has lived four years in Galesburg, Illinois, one year in Iowa City, Iowa, three years in Evanston, Illinois, and one year in Oberlin, Ohio, where she now resides. She is the wife of a professor of speech.

hɪz t͡ʃɪldrẹn tju wɝ rægɪ̣d ṇ wɑjld| æ̣z ɪf ðej bəlɔŋd tu nowbədi|| hɪz sʌn rɪp| ən ɝt͡ʃɪ̣n bɪ̣gɑtən ən ɪ̣z own lɑjknɪ̣s| prɑmɪstu ɪnhɛrɪ̣t ðə hæbɪ̣ts| wɪðɪ̣ owld klowz əv hɪ̣z fɑdɚ̣|| hi wəz d͡ʒɛnərəlị sin trupɪ̣ŋ lɑjk ə kowlt ɪ̣t ɪ̣z mʌðɚ̣z hilz| ɪ̣kwɪpt ɪn ə pɛr əv hɪ̣z fɑðɚ̣z kæstɔf gæləgæskənz| hwɪt͡ʃ hị hæd mʌt͡ʃ ədu tu hold ʌp wɪð wʌn hænd| æz ə fɑjn lejdị dʌz hɝ trejn ɪn bæd wɛðɚ̣|| rɪp væn wɪnkḷ hɑwɛvɚ̣ wəz wʌn əv ðoz hæpị mɔrtəlz| əv fulɪʃ| wɛl ojld dɪspəzɪʃənz| hu tejk ðə wɝld izị| it hwɑjt brɛd ɚ̣ brɑwn| hwɪtʃɛvɚ̣ hi kən gɛt wɪ̣ð list θɔt ɚ̣ trʌbḷ| ænd wʊd ræðɚ̣ stɑrv ɑn ə pɛnị ðən wɝk fɚ̣ə pɑwnd|| ɪf lɛftụ hɪmsɛlf| hi wʊd əv hwɪsḷd lɑjf əwej ɪn pɝfəkt kəntɛntmənt| bʌt hɪz wɑjf kɛp kəntɪnjuəlị dɪnɪ̣ŋ ɪn hɪz irz əbɑut hɪz ɑjdḷnəs| hɪz kɛjrləsnəs| æn ðə ruɪ̣n hi wəz brɪŋɪ̣ŋ ɑn ðə fæmlị||

9. This subject, aged about 29, was born in Atlanta, Georgia. The family moved to North Louisiana when she was about seven years old. Since then she has lived continuously in either North or South Louisiana. She is at present an instructor in speech in a Southern university.

mɔənɪ̣ŋ nun ṇːajt| hɜ tʌŋ wəz ṇsɛsəntlị gowɪ̣ŋ| æn ɛvrɪθɪ̣ŋ ị sɛd ɑ̣ dɪd wəz ʃuə tʊ prədjus ə tɑrənt əv haʊshowld ɛləkwənts|| rɪp æ̣d bʌt wʌn wej əv rɪ̣plajɪ̣ŋ tʊ̣ ɔlːɛktʃʊ̣z əv ðə kajnd| æn ðæt bạ frikwṇt jus| æd grown ṇtʊ ə hæbɪ̣t|| hi ʃrʌgd hɪz ʃowldəz| ʃʊk ɪ̣z hɛd| kæst əp ɪ̣z ajz| bət sɛd nʌθɪ̣ŋ|| ðɪs ɔlwẹjz provowkt ə freʃ vɑlị frəm ɪ̣z wajf| sow ðæt ị wəz fejn tʊ̣ drɔːf ɪ̣z foʷəsɪ̣z| ṇ tejk tʊ̣ ðə awtsajd əv ðə haws| ðɪ oẇnlị sajd hwɪtʃ| ṇ truθ| bịlɔŋz tʊ ə hɛnpɛkt hʌzbṇd|| rɪps sowl dəmɛstɪ̣k ædhɪrənt wəz ɪ̣z dɔg wʊlf| hu wəz æz mʌtʃ hɛnpɛkt æz ɪ̣z mæstə| fɑ̣ dejm væn wɪŋkḷ rɪgɑːdɪ̣d ðɛm æz kəmpænjənz ṇ ajdḷnɪs| ænd ivṇ lʊkt əpɑn wʊlf wɪð ṇ ivəl aj| æz ðə kɔz əv ɪ̣z mæstəz gowɪ̣ŋ əstrej||

10. This subject, aged about 30, was born and reared in South Dakota. He has attended the Universities of Minnesota and Iowa and is at present working on a doctor's degree at the latter institution.

tru ɪt ɪz| ðæt ɪn ɔl pɔjnts əv spɪrət bịfɪtɪ̣ŋ æn ɑnərəbḷ dɔg| hi wəz æz kɝ̣eɪdʒəs æn ænɪ̣məl æz ɛvɝ̣ skɑwrd ðə wʊdz| bət hwət kɝẹɪdʒ kæn wɪðstænd ðị ɛvɝ̣ɛndjurɪ̣ŋ ænd ɔl bịsɛtɪ̣ŋ tɛrɝ̣z əv ə wʊmənz tʌŋ|| ðə mowmənt wʊlf ɛntɝ̣d ðə hɑws hɪz krɛst fɛl| hɪz tejl drɑpt tu ðə grɑwnd| ɔr kɝld bịtwin ɪ̣z lɛgz| hi snikt əbɑwt wɪð ə gælowz ɛr| kæstɪ̣ŋ mɛnị ə sɑjdlɔŋ glæns æt dejm væn wɪṇkəl| ænd æt ðə list flɝɪ̣ʃ əv ə brumstɪk| ɔr ə lejdəl| hị wʊd flɑj tu ðə dɔr| wɪð jɛlpɪ̣ŋ prịsɪpɪ̣tejʃən|| tɑjmz gru wɝs ṇd wɝs wɪð rɪp væn wɪnkəl| æz jirz əv mætrɪ̣mownị rowld ɑn| ə tɑrtːʌŋ nɛvɝ̣ mɛlowz wɪð ejdʒ| ænd ə ʃɑrp tʌŋ ɪz ði ownlị ɛdʒd tul ðæt growz kinɝ̣ wɪð kɑnstṇt jus||

11. This subject, aged 29, was born in Southern Mississippi and lived there the first 19 years of her life. She then lived in South Texas for seven years and in South Louisiana for two years. She has done graduate work in speech and is at present a teacher of speech and English in a Texas high school. She has traveled rather widely in this country.

fɔrə lɒŋ hwajl hi justə kənsowl hɪmsɛlf hwɪᵀn drɪvṇ frəm howm| bạ frikwətɪ̣ŋ ə kajnd əv pɝ̣pɛtʃjụəl klʌb əv ðə sejdʒɪ̣z| fɪ̣lɑsəfəz ṇd ʌðə ajdḷ pɝ̣sənədʒɪ̣z əv ðə vɪlɪ̣dʒ| hwɪtʃ hɛld ɪtsːɛʃənz ɑn ə bɪᵀntʃ bəfowr ə smɔl ɪn| dɛzɪ̣gnejtɪ̣d baj ə rʌbəkənd poʷətrɪ̣t əv hɪz mædʒɪ̣stɪ̣ dʒɔrdʒ ðə θɝd|| hɪr ðej jus‿tə sɪt ɪn ðə ʃejd θru ə lɒŋ sʌmɝ̣z dej| tɔkɪ̣ŋ lɪstlɪ̣slɪ̣ owvər vɪlɪ̣dʒ gɑsɪ̣p| ɔr tɛlɪ̣ŋ ɪᵀnlɪ̣s slipɪ̣ stowrɪ̣z əbawt nʌθɪ̣ŋ|| bət ɪt wʊd hæv bɪn wɝθ ɪᵀnɪ̣ stejtsmənz mʌnɪ̣| tə hæ̣v hɝd ðə prəfawnd dɪskʌʃənz ðæ̣t sʌmtajmz tʊk plejs hwɛn| baj tʃæns| ṇ owld njʊzpejpər fɛl ṇtu ðɛr hænz| frəm sʌm pæsɪ̣ŋ trævələr|| haw saləmlɪ̣ ðeɪ wʊd lɪsṇ tə ðə kantɪnts æ̣z drɔᵒld awt baj dɛrɪ̣k væn brʌməl| ðə skulmæstər| ə dæpər lɝnɪ̣d lɪtḷ mæn| hu wəz nat tə bi dɔᵒntɪ̣d baj ðə mowst dʒajgæntɪ̣k wɝd ɪn ðə dɪkʃənɛrɪ̣| ṇd haw sejdʒlɪ̣ ðej wʊd dəlɪbərejt əpan pʌblɪ̣k əvɪnts sʌm mʌnts æftər ðej hæ̣d tejkṇ plejs||

12. This subject, aged about 30, was born and reared in Baton Rouge, La. Both parents are native Louisianians. Her grandfather was a Londoner. She attended grade school, high school, and college in Baton Rouge and has spent one summer in graduate study in speech at Northwestern University and one at the University of Iowa. She is at present a graduate student in speech at Louisiana State University.

ðɪ̣ ọpɪnjənz əv ðɪs dʒʌntow wɜ kəmplitlɪ̣ kəntrowld baj nɪkọləs vɛdə| ə pejtrɪ̣ək əv ðə vɪlɪ̣dʒ| æn lænlɔːd əv ðɪ̣ ɪn| æt ðə dowəz hwɪtʃ hɪ̣ sæt frəm mɔːnɪ̣ŋ tɪl najt| dʒʌst muvɪ̣ŋ səfɪʃəntlɪ̣ tụ əvɔjd ðə sʌn æ̣n kip ɪn ðə ʃejd əv ə laːdʒ tri| sow ðæt ðə nejbəz kʊd tɛl ðə awə baj hɪz muvmənts æz ækjʊ̣rətlɪ̣ æz baj ə sʌndajl|| ɪt ɪ̣z tru ðæt ɪ̣ wəz ræəlɪ̣ hɜd tʊ̣ spik| bʌt smowkt hɪz pajp ɪnsɛsəntlɪ̣|| hɪz æ̣dhɛrənts hawɛvə| fɔˀɛvrɪ̣ grejt mæn hæz hɪz æ̣dhɛrənts| pɜfɪ̣ktlɪ̣ ʌndəstʊd hɪm| æ̣n nɪu haw tʊ̣ gæðə hɪ̣z ọpɪnjənz|| hwɛn æmɪ̣θɪŋ wəz rɛd ɔː rɪ̣lejtɪ̣d ðæ̣t dɪsplizd hɪm hi wəz əbzɜvd tʊ̣ smowk hɪz pajp viəməntlɪ̣| æntʊ̣ sɛnd fowəθ| frikwənt æn æŋgrɪ̣ pʌfs||

13. This subject, aged 32, was born in Appenzell, Switzerland. She spoke a Swiss variety of German as a child and was educated through the grammar grades in Switzerland. She came to the United States at the age of 22 and has lived in Monroe, Wisconsin ever since. She is a housewife.

vɛn pliːst hi wʊt ɪ̣nhejl də smowk slolɪ̣ æn træ̣nkwɪlɪ̣| æn ɪ̣mɪtɪ̣t ɪn lajt æ̣n plejsɪ̣t klawt͡s| æn sʌmtajms| tejkɪ̣ŋ də pajp frʌm ɪs maut æn lɛtɪ̣ŋ də frægrʌ̣nt fejpɝ̣ kɝl əbawt ɪs nows| wʊt grejvlɪ̣ nɒtɪ̣s hɛt ɪn towkṇ əf pɜfɛḱt̀ æprọwbejʃʌ̣n|| frʌm ifṇ d̪ɪʃ (this) strɒŋhọwlt də ạnlʌkɪ̣ řɪp wʌs æt lɛnk͡t rawtɪ̣t bajɪ̣s tɝ̣mæd͡ʒɛ̣nt wajf hu wʊt sʌtənlɪ̣ brejk in ạpan də træ̣nkwɪlɪ̣tɪ̣ af dʌːsɛmblɪt͡ʃ æ̣nkɔldə mɛmbɝ̣z ɔld̪ụ nawt| nɔwr wʌs d̪æt ɔgʌs͡t pɝsənɪ̣t͡ʃ fedɝ hɪmsɛlf| sejkrɪ̣t frʌm də dɛrɪ̣ŋ tʌŋ əf d̪ɪs tɛrɪ̣bḷ fɪ̣rægow| hu t͡ʃart͡ʃt hɪ̣m awtrajt wɪt ɪnkɝɪ̣t͡ʃɪŋ hɪm ɪn hæbɪ̣ts əf ajdəlnɛ̣s||

14. This subject, aged 31, was born in a Scandinavian community in Wisconsin. His father came from Sweden and his mother from Norway. He is a farmer.

pʊr rɪp wəz ət læst rị̣dust ɔlmowst tə dị̣spɛr| ænɪz ownlị æ̣ltɝnətị̣v| tu ị̣skejp frʌm ðə lejbɝ əv ðə fɑrm| ænd ðə klæmɝ̣ əvɪs wɑjf| wʌz tə tejk ə gʌnᵊn̩ hænᵊn̩ strowl̩ əwej ɪntụ ðə wʊdz|| hɪrị wʊd sʌmtɑjmz sɪtị̣msẹlf æt ðə fʊtəvə tri| æn ʃæ˔r ðə kɑntẹnts əvị̣z wɑlẹt wɪð wʊlf| wɪθhwumị sɪmpəθɑjzd æz ə fẹlọw sʌfəɝ̣ ɪn pɝ̣səkjuʃən|| pʊr wʊlf| i wʊd sej| ðɑj mɪstrị̣s lidz ði ə dɔgz lɑjf əvị̣t| bʌt nɛvɝ̣ mɑjnd| məlæd| hwɪlst ɑj lɪv ðɑwʃæ̣lt nɛvɝ̣ wɑnt ə frɛnd tụ stæ̣nbɑj ðị|| wʊlf wʊd wægị̣z tejl| lʊk wɪstfụlị̣ ɪnị̣z mæstɝz fejs| ænị̣f dɔgz kị̣n fil pɪtị̣| ɑj virlị̣ bị̣livị rị̣sɪprəkejtị̣d ðə sɛnị̣mənt wị̣θɔlị̣z hɑrt|| ɪnə lɔŋ ræmbl̩ əv ðə kɑjnd ɑnəfɑjn ətʌmnəl dej| rɪp æ̣d ʌ̣nkɑnʃị̣slị̣ skræmbị̣d tu wʌn əv ðə hɑjẹst pɑrts əv ðə kætskị̣l mɑwntn̩s||

15. This subject, aged 54, was born in Farsend, Norway. He completed the grammar school in Norway and came to America at the age of 20. He lived in Chicago for 20 years, then moved to a farm in a Norwegian community in Wisconsin where he now lives. He speaks both Norwegian and Swedish fluently. His wife was born in Norway.

hi vʌs æftə hɪs fejvoət spɒːt ʌf skwɝəl ʃutị̣ŋ| æn di stɪl sɒlị̣tuts hæd ɛkọt æn ɾijɛkot vɪt d̠ɛ̣ rəpɒts ɒf hɪs gʌn|| pæntị̣ŋ æn fætị̣gjud hi t̠ru hị̣msɛlf lejt ɪn di æftɝ̣nụn ɔn ej grin nowəl| kʌvɝ̣d vɪt mɑwntən hɜbị̣d͡ʒ d̠æt krɑwnt͡di brow ʌf ej prɛsɪpị̣s|| frʌm æn owpənị̣ŋ bị̣twin dej tris| hi kʌd ovəlʊk di lowə kʌntrị fə mɛnị ej mɑjl ʌf rit͡ʃ wʊtlæ̣n|| hi sɒ æt ej dɪstn̩s dej lɒːdlị hʌtsən| fɑə fɑə bị̣low hɪm| muvị̣ŋ ɔn ɪts sɑjlẹnt bʌt mæd͡ʒẹstị̣k kɒəs| vɪt dɪ ɾị̣flɛkʃʌ̣n ɒf ej pɜpl̩ klɑwt̠| ɔdə sejls ɒf ej lægị̣ŋ bɑːk| hɛr æn dɛjr slipị̣ŋ ɔn ɪts glejsɪ bɑsʌ̣m (glassy bosom)| æn æt læst lowsị̣ŋ ị̣tsɛlf ɪndə blu hɑjlæ̣nts|| ʌn dej ʌdɝ̣ sɑjt| hi lʊk͡t dɑwn ị̣ntu ej dip mɑwntn̩ glɛn| vɑjlt æn lownlị̣ æn ʃægẹt| dɪ bɑtʌ̣m fɪlị̣d vɪt̠ frækmẹnt͡s frʌm dej ị̣mpɛndị̣ŋ klɪfs| æn skɛrslị̣ lɑjtəd bɑj di rəflɛktị̣d rejz ʌf di sɛtị̣ŋ sʌn||

16. This is a duplication of the material in Sample 15. The student will find it interesting to compare two quite different readings of the same material. This subject is 25 years old. She was born in a small town in Southern California, where she was educated through the grades and high school. Her college work was done at Los Angeles. She then taught three years in a grade school and did one year of graduate work in speech at the University of Wisconsin.

hi wəz æftɝ̣ hɪz fejvərɪt sport əv skwɝəł ʃutị̣ɲ| ænd‿ðə stɪł sɑłətjudz hæd ɛkọd æ̣nd rɪɛkọd wɪθ‿ðə rị̣ports əv hɪz gʌᵀn|| pæntị̣ɲ æ̣nd fətiɟd| hi θru hɪmsɛłf| lejt ị̣n ðị̣ æftɝ̣nun| ɑn ə gʁin‿nowł| kʌvɝd wɪð mɑwntn̩ ɜbɪ̣d͡ʒ| ðət kʁɑwnd ðə brɑw əv ə prɛsəpɪ̣s|| frʌm ən opənɪ̣ɲ bɪ̣twin ðətriz| hi kʊ̣d ovɝ̣łʊk ðə lowɝ̣ kʌntrɪ̣ fɝ̣ mɛnɪ̣ ə mɑjl əv rɪt͡ʃ wʊdłənd|| hi sɔ ət ə dɪs͡tən͡ts ðə lɔrdlɪ̣ hʌdsṇ| fɑr fɑr bɪ̣low ɪ̣m| muvɪ̣ɲ ɑn its⁀sɑjlənt bʌ̣t məd͡ʒɛstɪ̣c kors| wɪθ⁀ðə rɪ̣fłɛcʃən əv ə pɝpəł kłɑwd| ɝ̣ ðə sejl əv ə læɟɪ̣ɲ bɑrk| hɪr ən ðɛr słipɪ̣ɲ ɑn it͡s głæsɪ̣ buzṃ| æ̣nd ət læs͡t łuzɪ̣ɲ ɪ̣tsɛlf ɪ̣n ðə błu hɑjlənd͡ʒ|| ɑn ðɪ ʌðɝ̣ sɑjd| hi łʊkdɑwn ɪntu ə dip mɑwntṇ glɛn| wɑjld| ənd łownlɪ̣| æ̣nd ʃæɟɪ̣d| ðə bɑtəm fɪld wɪθ fræɟmṇts frəm ðɪ̣ ɪ̣mpɛndɪ̣ɲ klɪfs| æ̣nd scɛrslɪ̣ łɑjtɪ̣d bɑj ðə rɪ̣fłɛctɪ̣d rejz əv ðə sɛtɪ̣ɲ sʌn||

17. This subject, aged 34, was born in rural, central Illinois where she lived until the age of 20. She attended a college in Indiana for four years, returned home for one year, lived a year in Pennsylvania, another in Tennessee, and three years in Chicago. For the past five years she has been a teacher and religious director in Wisconsin. In connection with her work she directs dramatic productions.

fɔ̣ sʌm tɑjm rɪp lej mjusɪ̣ɲ ðɪsːin| ivnɪ̣ɲ wəz gʁæd͡ʒụəlɪ̣ æ̣dvænsɪ̣ɲ| ðə mɑwntɪ̣nz bɪ̣ɟæn tə θrow ðɛr lɔŋ blju ʃædọz owvɝ̣ ðə væʲlɪ̣| hɪ̣ sɔ ðɪ̣t ɪt wʊ̣d bɪ̣ dɑrk łɔŋ bɪ̣for hi kʊd rit͡ʃ ðə vɪłɪ̣d͡ʒ| ænd hɪ̣ hivd ə sɑj wɛn ɪ̣ ðɔt əv ɛ̣nkɑwntɝ̣rɪ̣ɲ ðə tɛrɝ̣z əv dejm væn wɪɲkəł|| æz hi wəz əbɑwtə dɪ̣sɛnd| hi hɝd ə vɔjs frʌm ðə distən͡ts həłuɪ̣ɲ| rɪp væn wɪɲkəł| rɪp væn wɪɲkəł|| hi lʊkt ərɑwnd| bʌt kʊd si nʌðɪ̣ɲ bʌt ə krow wɪɲɪɲ ɪt͡s sɑłətɛrɪ̣ fłɑjt əkrɔs ðə mɑwntɪ̣n|| hi θɔt hɪs fænsɪ̣ mʌs͡tɪ̣v dɪ̣sivd hɪm| ænd tɝ̣nd əgɛn tʊ̣ dɪ̣sɛnd| wɛn hi hɝ̣d ðə sejm krɑj rɪɲ θrụ ðə s͡tɪł ivnɪ̣ɲ ɛr| rɪp væn wɪɲkəł| rɪp væn wɪɲkəł|| æ̣t⁀ðə sejm tɑjm| wʊłf brɪsɪ̣d ʌp hɪz bæc| ænd gɪvɪ̣ɲ a łow grɑwł| skʌłkt ovɝ̣ tʊ̣ hɪz mas͡tɝ̣z sɑjd| łʊkɪ̣ɲ fɪrfəłɪ̣ dɑwn ɪntʊ̣ ðə głɛn||

18. This material duplicates that in sample 17. The subject is 48 years old. He was born in Switzerland. His first language was German. He was educated through the grammar school in Switzerland, the medium of instruction being German. He came to America at the age of 15 and lived for four years in a Swiss community in Wisconsin before moving to a farm in Chippewa County, Wisconsin, where he now resides.

fɔr zʌm tɑjm rɪp lɪ̣ mʌsɪ̣ŋ dɪs zin| ifnɪ̣ŋ wʌz græt͡ʃəlɪ̣ ædvænzɪ̣ŋ| də mɑwntṇz bɪ̣gæn tə d̪row dɛr lɔŋ blu ʃædəz ovə də vælɪ̣| hi zɔ dæt ɪt wʊ̣d bɪ̣ dɑrk lɔŋ bɪfowr hi kʊ̣driːt͡ʃ də vɪlɪ̣d͡ʒ| ænd hɪ̣ hiːvt ə sɑjt vɛn hi d̪ɔt`əv ɛ̣nkɑwntrɪ̣ŋ də tɛrɝ̣z əv dæm fæn wɪŋkḷ|| æs hi wʌs əbɒwt tə disɛnd| hi hiɾd ə vɔjs frʌm də dɪstṇts hɑlɝ̣rɪ̣ŋ| rɪp fæn wɪŋkḷ|

rɪp fæn wɪŋkḷ‖ hi lʊkt ərɑwnt| bʌt kʊd si nʌdɪ̣ŋ bʌt ə krow vɪŋɪŋ ɪts sɑ̣lɪ̣tærɪ̣ flɑjt əkrɔs də mɑwntṇ‖ hi ḍɔt hɪs fænsɪ̣ mʌst æ̣v dɪ̣ziːvt hɪm| ænd tɝnt ɪ̣gɛn tu dɪ̣zɛnt| wɛn hi hiɾd də sejm krɑj rɪŋ dru də ʃstɪl ifnɪ̣ŋ ɛr| rɪp fæn wɪnkḷ| rɪp fæn wɪnkḷ‖ æt də zejm tajm vʟf brɪstḷd ʌp hɪz bæk| ænd gɪfɪ̣ŋ ə low grɑwḷ| skʌlkt ofɝ̣ tu hɪz mæstɝ̣z sɑjd| lʊkɪ̣ŋ firfʊ̣lɪ̣ dɑwn ɪntụ də glin‖

19. This subject,[2] aged 20, was born at Khalavha, near Sibasa. He spoke Tshivenda and German until he was six years old. At the age of 6 he went to Lydenburg where he learned Afrikaans and started to learn English. When he was 14 he went to Germany for two years; then he returned to school at Bloemfontein for a year and a half. English, Afrikaans, and German were the languages used at school. After working a year in the magistrate's court, he started work in the University where he learned Zulu.

rɪp nɑw fɛlt ə vɛ˔g æprɪ̣hɛntʃən stilɪ̣ŋ əovə hɪm| hi lʊkt æ˔ŋktʃəslɪ̣ ɪ̣n ðə sejm dɑjrɛktʃən| æn pɝ̣sivd ə strejndʒ fɪgə sləowlɪ̣ tɔjlɪ̣ŋ əp ðə rɒks| æ̣n bɛndɪ̣ŋ ʌndə ðə wejt əv sʌmθɪ̣ŋ hɪ̣ kærɪ̣d ɔn ɪ̣z bæk‖ hi wəz səprastːʊ si ɛnɪ̣ ħjumən biɪ̣ŋ ɪ̣n ðɪs lᵋownlɪ̣ æ̣n ʌnfrikwəntɪ̣d plejs| bʌt səpᵊowzɪ̣ŋ ɪt tʊ̣ bi sʌmwʌn əv ðə nejbəhʊd ɪn nid əv hɪ̣z æ̣sɪstənts| hi hejsṇdːɑwn tụ jild ɪt‖ ɔn nɪrər æ̣prᵊowtʃ ɪ̣ wəz stɪl mowr sɝ̣prazd æ̣t‿ðə sɪŋgʊ̣lɛrətɪ̣ əv ðə strejndʒəz æ̣pɪrənts‖ hi wəz ə ʃɔːt| skwɛᵊ fᵋowlow wɪθːɪk bʊʃɪ hɛᵊr æ̣nd ə grɪzɪ̣d bɪəd‖ hɪz drɛs wəz əv ðɪ̣ æntik dʌtʃ fɛᵀʃən| ə klɔθ dʒɛkɪ̣n strɛᵀpt æ̣ɾɑwnd ðə wɛjst| sɪᵀvrəl pɛᵊz əv britʃɪ̣z| ðɪ̣ awtə wʌn əv æmpḷ vɒljụm| dɛkọrejtɪ̣d wɪ̣ð rᵋowz əv bʌtṇz dawn ðə saʲdz æn bʌntʃɪ̣z æ̣t ðə niz‖

20. This subject, a native African, aged about 24, was born at Danzig in the Pietersburg District, South Africa. His first language was the Sesotho dialect, sometimes called Pedi. When he was eight years old, he started to school at the mission station, where he learned the Sepedi dialect and English. At the age of 11 he went to a boarding school and "came in contact with a certain amount of good English." He learned Zulu and Xhosa at a normal college where he took a teacher's course. He is now teaching in Johannesburg. He speaks English, Afrikaans, and Pedi.

hi boˀ ɔn ɪ̣z ʃowldɝ̣ ẹ stɑwt kɛg̱| ðæt simd tʊ̣ bɪ̣ fʊˀləv lɪkə| æ̣n med saᴵns fɔʁɪp tụ ạprowtʃ ạn æsɪst hɪm wɪðːə lod‖ ðow raðɝ̣ ʃɑj ạndɪ̣stʁɑ⊥stfəl əv ɪ̣z nju ạkwejntənts| ʁɪp kọmplɑjd wɪθɪ̣z juʃəl ạlækrətɪ̣| æn mjutʃəlɪ̣ ʀ̌livɪ̣ŋ wʌn ạnɑðə| ðe klɛᵀmbəd ʌp ẹ næ⊥ro gʌᵀlɪ̣| ɑ̣pɛrəntlɪ̣ ðə drɑj bɛd̥ əfə mɑwntən tɔrənt‖ æz ðej ạsɛndɪ̣d| ʁɪp ɛvrɪ̣ nɑw ạn ðɛn hɜd lɔŋ ʀolɪ̣ŋ pilz lɑjk dɪstənt θɑndə| ðạt simd tụ ɪsʃɪ̣u ɑwtəvə dip ʁạvin| ɔːʁaðə| klɛft| bɪ̣twin lɒftɪ̣ ʁɒks| təwʌːd ħwɪtʃ ðɛə ʁʌgɪ̣d pɑθ kəndɑ⊥ktɪ̣d‖ hi pɔ̥zt fɔr ạn ɪnstạnt| bət səpozɪ̣ŋ ɪt tụ bɪ̣ wʌn əv ðiz træntʃɪ̣ənt ðɑ⊥ndə ʃɑwᵊz wɪtʃ ɔfṇ tek ples ṇ mɑwntɪ̣n hɑjts| hi prosidɪ̣d‖

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[2] Samples 19 to 24, inclusive, were transcribed from recordings furnished by Harry S. Wise of the Sub-Department of Phonetics at the University of Witwatersrand in Johannesburg, South Africa.

21. This subject, aged 28, a native South African, was born near Zoekmakaar. He went to school at 10 and learned the native dialect, Sepedi, and studied elementary English. Later he studied in the Orange Free State and learned Afrikaans and a little Zulu. He is at present in the University of Witwatersrand at Johannesburg.

pasɪ̣ŋ ðʁu ðə ʁavin| ðej kem tụ ẹ hɒlo| lɑjk ẹ smɔl æ̣mpɪ̣θɪ̣eətɑ̣| səʀɑwndɪ̣d bɑj pəpɛndɪ̣gjụlɑ̣ prɛsəpɪsɪ̣s| owvɑ̣ ðɪ bʀ̌ɪŋks ɔ̣f witʃ ɪmpɛndɪ̣ŋ tris ʃɒd ðɛə brạntʃɪ̣z| so ðæt ju onlɪ̣ kɒt glɪmpsɪ̣s ɔ̣v æzowr skɑj ạn ðə bʀ̌ajt ivənɪ̣ŋ klaᵘd̥‖ djurɪ̣ŋ ðə hol t̠ajm| ʀ̌ɪ⊥p ạn hɪs kọmpænjən hẹd lejbɑ̣d ɔn ɪn sajlənts| fɔr ħwɑjl ðə fɔːmə mɑːvəld gʁejtlɪ̣ ħwɑt kʊd̥ bi ðə pʌpəs ɔ̣v kɛʁɪ̣ŋ ẹ kɛ⊥g ɑ̣v ligɑ̣ ɑb̥ ðɪs wajld mɑwntɪ̣n| jɛd̥ dɛʁ wɑs sɑmpθɪ̣ŋ strendʒ æn ɪnkɒmprɪ̣bəl (incomprehensible) ɑ̣bɑwt ðɪ̣ ɑ̣nːown| ðæt ɪ̣nspɑjəd ɔː æn tʃɛkt fəmɪlɪ̣ɛrətɪ̣‖ ɔn ɛntərɪ̣ŋ ðɪ̣ æmfɪ̣θɪ̣etɑ̣| nụ ɒbdʒɛts ɑ̣v wɑᵀndɑ̣ prɪ̣sɛntɪ̣d ðɛmsɛlfs‖ ɔn ej lɛvɪ̣l spɒt ɪ̣n ðɪ̣ sɛntɑ̣ wɑ̣s ẹj kɑmpæ̣nɪ̣ ɔ̣f ɒd lukɪ̣ŋ pɛrsṇɪ̣dʒɪ̣s plejɪ̣ŋ æt nɑjnpɪns‖ ðej wʊř drɛst ɪ̣n ẹj kwejnt| ɑwtlɛndɪ̣ʃ faʃən| sɑm woə ʃɔːt dʌᵀblɪ̣ts| ɑ⊥ðəz dʒɜkɪ̣nz wɪθ lɔŋ najvz ɪ̣n ðɛə bɛlts| ạn moʊstəv ðɛm hæd ɪ̣nɔːməs břitʃɪ̣s ɔ̣f simɪ̣lɑ̣ stɑjl wɪθ ðæt ɔv ðɛə gɑjds‖

22. This subject, aged 47, was born and reared in South Africa. His first language was Afrikaans. He learned to speak English and High Dutch at school. He has lived in Johannesburg since 1912.

ðɛə vɪsɪ̣dʒɪ̣z| tu| wɜ pəkjulə| wʌn hæd ə lɑːdʒ bɪəd| brɔd fejs| ạn smɔl pɪgɪ̣ʃ ɑjz| ðə fejs əv ạnʌðə simd tụ kənsɪst ẹntɑjəlɪ̣ əv nowz| ænd wɒz sərɑwndɪ̣d bɑj ə wɑjt ʃʊgə lowf hæt| sɛ⊥t ɔf wɪθ ə lɪtəl řɛd kɒkstejl‖ ðej ɔl had bɪədz əv vejrɪ̣əs ʃejps ạn kʌləz‖ ðɛə wʌz wʌn hu simd tụ bi ðə kọmandə‖ hi wɔz ə stawt owld dʒɪntɪ̣mən| wɪθ ẹj wɛðɪ̣bitṇ kawntənəns| hi wɔɾə lejst dʌblɪ̣t| brɔd bɛlt ạn hæŋgə| hɑj krawnd hæt ạn fɛðə| řɛd stɒkɪ̣ŋz ạnt hɑj hild ʃuz wɪð řowzɪ̣z ɪn ðɛm‖

ðə howl gř̌up rịmɑjndịd ř̌ip ʌv ðə fɪgəz ịn æ̣n owld flɛmịʃ pejntịŋ| ɪn ðə pɑːlə ɾəv domịnị væn ʒɑjk| ðə vɪlịtʃ pɑːsən| ænd wɪtʃ hæd bɪn brɔt owvə frʌm hɒlənd æt ðə tɑjm əv ðə fɜst sɛtḷmịnt||

23. This subject, aged about 23, was born in Johannesburg, South Africa. When she was three months old her family moved to a farm in East Transvaal where she lived until she was 9. During this period she visited Swaziland several times, at four she spent a few months in Australia, and at six she spent six months in England. Her childhood languages were English and Swazi. At the age of 9 she went to school in Johannesburg, where English and French were spoken, and stayed there until she was sixteen, when she went to Australia for six months, afterwards returning to the University at Johannesburg for three years. Here she studied French for three years and Italian and Zulu for one year, besides learning a little Afrikaans. In 1938 she went to England for a year, traveling two months of that time in Germany and two months in France. She returned to Johannesburg in 1939.

wɑt simd pətɪkjulərlị ɒd tụ rɪp wɑz| ðɛ̣t ðəow ðiz fᵊoʊks wɜrɛvịdəntlị æ̣mjuzịŋ ðɛmsɛlvz| jɛt ðej mentejnd ðə grejvịst fɛ˔js| ðə mᵊowst mịstɛrịəs sɑjlənts| æn wɜː| wɪðɒl| ðə mᵊowst mɛlæ̣nkọlị pɑːtị‿əv plɛʒə hi hæ̣d ɛvə witnịst|| nɑθịŋ ɪntərʌptịd ðə stɪlnịs əv ðə sin bʌt⁀ðə nɔjz əv ðə bɒɫz| ħwɪtʃ| ħwẹnɛvə ðej wɜrᵊowld| ɛkowd əlɔŋ ðə mɑwntịnz lɑjk rʌmblịŋ pilz əv θɑ˔ndə|| æz rɪp ən hɪz kʌmpænjən əprᵊowt͡ʃt ðəm| ðej sɑ˔dṇlị dịsɪstịd frʌm ðɛə plɛj| ṇ stɛ˕əd ət ðəm wɪð sɑtʃ fɪkst stætʃu lɑjk gɛjz| æn sʌtʃ stre˕jndʒ| ʌnkuθ| lɛ˕klʌstə kɑntənənsịz| ðæt hịz hɑːt tɜnd wɪðɪn hɪm| æn hịz niz smᵊowt tụgɛðə|| hɪz kəmpænjən nɑw ɛmptịd ðə kɒntɛnts əv ðə kɛ˔g ɪntụ lɑːdʒ flɛ˕gənz| ṇd mejd sɑjnz tụ hɪm tụ wejt əpɑn ðə kɑmpṇɪ|| hi ọbejd wɪð fɪər æn trɛmblịŋ| ðej kwɒft ðə lɪkər ɪn prəfɑʷnd sɑjlənᵗs| æn ðẹn rịtɜnd tʊ ðɛə gɛ˔jm||

24. This subject, aged 17, was born in Durban, South Africa. His parents lived on a dairy farm in the suburbs. When he was four, they moved to a farm at Ladysmith and for the next few years lived on various farms in South Natal. Later he moved with his family to a native trading station at Umzimkhulu where they stayed for three years. During this time he was taught at home by his mother. The family then moved to a farm 25 miles northeast of Pretoria and the boy attended the Pretoria Boy's High School. In 1938 he entered the Witwatersrand University where he was when this sample was taken. The subject speaks Afrikaans and Zulu.

bɑj dɪ̣griz rɪps ɔo æn æprɪ̣hɛntʃən səbsɑjdɪ̣d‖ hi ivɪ̣n vɛntʃɜ̣d| ħwɪn now ɑj wəz fɪkst əpɒn hɪm| tə tejst ðə bɛvərɪ̣dʒ| wɪtʃ hɪ̣ fɑwnd hɛ̣d mʌᵀtʃ ðə flajvər əv ɛksəlɪ̣nt hɒləndz‖ hi wəz nætʃ̣ɚəlɪ̣ ə θɜstɪ̣ sᵊowl| æ̣n wəz sun tɪmptɪ̣d tụ rəpit ðə drɔt‖ wʌn tɛjst prọvowkt æ̣nʌðə| hi riɪtɚ̣ejtɪ̣d hɪ̣z vɪzɪ̣ts tụ ðə flɛgən sow ɔfɪ̣n ðæt æ̣t lɛŋkθ hɪz sɛ⊥nsɪ̣z wɜ ᵊowvəpawəd| hɪz ɑjz swæm ɪn hɪ̣z hɛd| hɪz hɛd grædʒụəlɪ̣ dɪ̣klɑjnd| æn hɪ̣ fɛl ɪntụ ə dip slip‖ ɔn wajkɪ̣ŋ| hi fɑwnd hɪ̣msɛlf əpɔn ðə grin nᵊowl ħwɛ hi hɛ̣d fɜst sin ðɪ̣ ᵊowld mæn əv ðə glɪn‖ hi rʌbd hɪ̣z ɑjz| ɪt wɑ̣z ə braᵊt sʌnɪ̣ mɔːnɪ̣ŋ‖ ðə bɜdz wɜ hɒpɪ̣ŋ æ̣n twɪtərɪ̣ŋ ẹmʌŋ ðə bʊʃəz| æ̣n ðə igəl wəz ħwilɪ̣ŋ əlɒft æ̣n brɛstɪ̣ŋ ðə pjʊə maʊntɪ̣n briz‖

25. This subject, aged 51, was born on the Isle of Mann. She lived there until she was 24, then moved to England for four years before migrating to the United States. She took nurse's training in this country and practiced for many years, after which she married a native American of English descent and retired from her profession.

ʃɜlɪ̣| θɔt ɾɪp| ɑj hæv nɒt slɛpt hɪə ɔl nɑjt‖ hi rɪ̣kɒld ðə s͡trejnd͡ʒ əkɜᵀn̩̣tsẹz bɪ̣fɒɾ hi fɛl əslip‖ ðə s͡trejnd͡ʒ mæn wɪðə kɛg əv lɪkɜ̣| ðə mɑwntn̩̣ rəvin| ðə wɑjld rɪ̣trit əmʌŋ ðə rɒks| ðə woᵊbɪ̣gɔ̣n pɑːti æt nɑjnpɪ̣nz| ðə flægɪ̣n| owᵊ ðæt flægɪ̣n| ðæt wɪkɪ̣d flægɪ̣n| θɔt řɪ̣p| ħwɒt ẹkskjus ʃæl ɑj mejk tu dejm væn wɪŋkl̩̣‖

26. This subject, aged 32, was born in California. She moved to Spokane, Washington, at the age of two and lived in Washington and Idaho until she was 27 years old. In college, a speech instructor insisted that she cultivate a kind of "stage speech" for her habitual pronunciation. She has lived four years in Oregon, and was for two years an instructor in Speech and English in an Oregon high school. She is at present a graduate student in speech at Louisiana State University.

hi lʊkt rɑwnd fɔr hɪz gʌn| bʌt ɪ̣n plejs əv ðə klin wɛl ɔjld fɑwlɪ̣ŋ pis| hɪ̣ fɑwnd æ̣n owld fɑjrlɑk lɑjɪ̣ŋ bɑj hɪ̣m| ðə bɛrl ɪnkrʌstɪ̣d wɪθ rɑ⊥st| ðə lɑk fɔlɪ̣ŋ ɔf| æ̣n ðə stɑk wɜmitn̩̣‖ hi nɑw səspɛktɪ̣d ðæ̣t ðə grejv rɔjstɚ̣z əv ðə mɑwntɪ̣n hæd pʊt ə trɪk əpɔn hɪm| æ̣n hævɪ̣ŋ dowst hɪ̣m wɪθ lɪkɚ̣| hæd rɑbd hɪm əv hɪz gʌn‖ wʊlf tu hæ̣d dɪsəpɪrd| bət hɪ̣ mɑjt hæ̣v strejd əwej æftɚ̣ ə skwɜl ɔ̣r ə pɑrtrɪ̣dʒ‖ hi hwɪsl̩̣d aftɚ̣ hɪm æ̣n ʃɑwtɪ̣d hɪ̣z nejm| bət ɔl ɪ̣n vejn| ði ɛkowz rɪ̣pitɪ̣d hɪz hwɪsl̩̣ ən ʃɑwt| bʌt now dɔg wəz tụ bɪ̣ sin‖ hi dɪ̣tɜmɪ̣nd tụ rivɪzɪ̣t ðə sin əv ðə last ivnɪ̣ŋz gæmbəl| ænd| ɪf hɪ̣ mɛt wɪð ɛnɪ̣ əv ðə pɑrtɪ̣| tụ dɪ̣mand hɪ̣z dɔg æ̣n gʌn‖ æz hɪ̣ rowz tụ wɔk hɪ̣ fɑwnd hɪ̣msɛlf stɪf ɪ̣n ðə dʒɔjnts|

æn wɑntɪ̣ŋ ɪ̣n hɪz juʒjəl æktɪvətɪ̣‖ ðiz mɑwntṇ bɛdz dụ nɑt əgri wɪ̣ð mi| θɔt rɪp| æ̣n ɪ̣f ðɪs frɑlɪ̣k ʃʊd lej mị ʌp wɪð ə fɪt əv ðə rumətɪ̣sm| ɑj ʃæl hæv ə blɛsɪ̣d tɑjm wɪð dejm væn wɪŋkḷ‖ wɪθ sʌm dɪfɪ̣kʌltɪ̣ hi gɑt dɑwn ɪntʊ̣ ðə glɛn| hi fɑwnd ðə gʌlɪ̣ ʌp hwɪtʃ hi ænd hɪ̣z kəmpænjən hæd əsɛndɪ̣d ðə prisidɪ̣ŋ ivnɪ̣ŋ| bʌt tụ hɪz æ̣stɑnɪ̣ʃmənt| ẹj mɑʊntɪ̣n strim wəz nɑw fowmɪ̣ŋ dɑwn ɪ̣t| lipɪ̣ŋ frəm rɑk tụ rɑk| æn fɪlɪ̣ŋ ðə glɛn wɪθ bæblɪ̣ŋ mɝmɚ̣z‖

27. This subject, aged 18, was born and reared in Donaldsonville, in the Acadian French section of South Louisiana. His father came from Cefalu, Italy; his mother was American born but of Italian descent. English was his first language, but he also learned a little Italian as a child and later learned to speak "Cajun" French. No French is spoken in his home, but his grandmother speaks Italian most of the time.

hi hɑwɛvə mejd ʃɪf tʊ̣ skræmbḷ ʌp ɪts sɑdz| wɜkɪ̣ŋ hɪz tɔjlsəm wej θru θɪkɪ̣ts əv bɜtʃ| sæsəfæs| æ̣n wɪtʃ hejzḷ| ən sʌmtɑjmz trɪpt əp ɔr ɛntæŋgḷd bạ ðə wɑld grejp vɑənz ðæ̣t twɪstɪ̣d ðɛə kɔjlz ọr tɪndrḷz frəm tri tʊ̣ tri| æ̣n sprɛd ə kɑn əv nɛtwɜɪk ɪ̣n ɪ̣z pæθ‖ æt lɛnθ hị ritʃt tʊ̣ wɛə ðə rəvin hæ̣d owpṇd θru ðə klɪfs tʊ̣ ðɪ̣ æmpɪθiətə| bʌt nọ trejsɪ̣z əv sʌtʃ ən opɪ̣nɪ̣ŋ rɪ̣mejnd‖ ðə rɑks prɪ̣sɛntəd ə hɑj ɪmpɛnətrəbḷ wɔl| owvə wɪtʃ də tɔːənt kejm tʌmblɪ̣ŋ ɪ̣nə ʃit əv fowm| æ̣n fɛl ɪ̣ntʊ̣ ə brɔd| dip bejsɪ̣n| blæk frəm ðə ʃædowz əv ðə sərɑwnɪ̣ŋ fɔːɪs (forest)‖ hɪə ðɛn powə rɪp wəz brɔt tʊ̣ ə stæn‖ hi əgɛn kɔld ən wɪsḷd æftə hɪz dɔg| hi wəz ownłɪ̣ ænsəd bạ ðə kɔɪ̣ŋ əv ə flɑk əv adḷ krowz| spoətɪ̣ŋ ha ɪ̣n ðə ɛəbʌv (air above) ə dra tri ðæ̣t owvəhʌŋ ə sʌnɪ̣ prɛsəpɪ̣s| æ̣n hu| səkjʊr ɪ̣n ðɛə ɛləvejʃən| simd tʊ̣ lʊk dɑwn æ̣n skɑf æ̣t ðə powə mænz pəplɛksətɪ̣z‖

28. This subject, aged about 35, was born and reared in Lynn, Mass. At the age of 18 he started to attend Wesleyan University in Connecticut where he studied for five years. Since that time he has taught three years at the University of Minnesota, three at Wesleyan University and two at Louisiana State University, as an instructor in psychology.

wɑt wəz tụ bi dʌn| ðə mɔːnɪ̣ŋ wəz pæsɪ̣ŋ əwej| æn rɪp fɛlt fæmɪ̣ʃt fɔ̣ wʌnt əv ɪ̣z brɛkfəst| hi grivd tụ gɪv əp ɪ̣z dɔg æ̣n gʌn| hi drɛdɪ̣d tụ miˀɪz wɑjf| bət ɪ̣t wʊd nɑt du tụ stɑːv æ̣mʌŋ ðə mɑwntɪ̣nz‖ hi ʃʊk ɪ̣z hɛd| ʃowldɚ̣d ðə rʌstɪ̣ fɑjr lɑk| æ̣n wɪðə hɑːt fʊl əv trʌbəl æ̣n æŋzɑjətɪ̣ tɝnd ɪ̣z stɛps howmwəd‖ æz ị æ̣prowtʃt ðə vɪlɪ̣dʒ| hị mɛt ə nʌmbər əv pipəl| bət nʌn hum ị nu| wɪtʃ səmwɑt səprajzd ɪ̣m| fọr hị θɔt hɪmsɛlf əkwejntịd wɪð ɛvrɪ̣ wʌn ɪ̣n ðə kʌntrɪ̣ rawnd|| ðɛə drɛs tu wəz əv ə dɪfrənt fæʃən frəm ðæt tụ wɪtʃ ị wəz æ̣kʌstəmd|| ðej ɔl stɛəd æ̣t hɪm wɪθ ikwəl mɑːks əv səprɑjz| æ̣n wɛnɛvə ðej kæst ðɛr ɑjz əpɔn hɪm| ɪnvɛrɪ̣əblɪ̣ strowkt ðɛə tʃɪnz||

29. This subject, aged about 20, was born in Panama City, Panama. He studied English for four years in high school, but spoke almost no English when he came to this country in May 1939. He has been in this country about eight months as a student at Louisiana State University. He has had no special help in learning English.

d̠i kɑnstəns (constant) rɪ̣kjurənts (recurrence) əv ðɪs jɛstʃɝ̣ ɪndjust rɪp| ɪnvɔləntɛrəlɪ̣| tʊ̣ d̠u ðị sejm| wɛn t̠ụ hɪs æ̣stɑnɪ̣ʃmənt| hi fɑwn hɪz̥ bɛrd (beard) hæd grɑwn t̠ʊ̣ bi ẹ fʊt lɑŋ|| hi hæd̥ nɑw ɛntɝd d̠i ɛskɝts (outskirts) əv d̠ị βɪlɪ̣dʒ|| ẹ t̠rʊp əv ɛstrejnʒ ʃɪldrən ræn æt hɪz̥ hilz̥| hutɪ̣ŋ æftɝ̣ him æ̣n pɔjntɪ̣ŋ æt hɪs grej bɛrd|| d̠i dɑks | t̠u | nɒt wʌn əv hwɪtʃ hi rɛkəgnɑjzɪ̣z (recognized) fọr æ̣n ol ækətænts (acquaintance) bɛrkəd æt him æ̣s hi past|| d̠i vɛrɪ̣ βɪlɪ̣ʒ (village) wəs ælɝd (altered)| ɪt wəs lɑʒər æn mor pɒpjuləs|| ðɛr wɝ rows əv hɑwzɪ̣z hwɪʃ hi hɛd nɛvɝ̣ sin bịfowr| æ̣n ðowz hwɪʃ hæd bɪn fæ̣miliər hɑwnts hæḍ dɪsæpɪrəd|| ɛstrejnʒ nejms wɝ ovɝ d̠i dors| ɛstrejnʒ fejsɪ̣s æ̣t d̠i wɪnd̠os| ɛvrɪ̣sɪŋ wəs ɛstrejnʒ|| hɪs mɑjn· nɑw mɪsgejv him| hi bɪ̣gæn tʊ̣ dɑwt wɛd̠ɝ̣ boθ hi æ̣n d̠i worl æ̣rɑwn him wɝ nɑt bɪ̣wɪtʃəd||

30. This subject, aged about 22, was born in Oklahoma. His parents were natives of Arkansas. When he was three years old his family moved to Natchitoches, Louisiana (North Louisiana), where he has lived ever since. He went to college in Natchitoches and majored in speech. He has had one summer of graduate work in speech at Northwestern University. As a high school teacher he taught speech for one year in Oakdale, Louisiana and one year in Gulfport, Mississippi. He is at present a graduate student in speech at Louisiana State University.

sɝlɪ̣ ðɪs wəz hɪ̣z nejtɪ̣v vɪlɪ̣dʒ| hwɪtʃ hị hæd lɛft ðə dej bəfour|| ðɛr stʊd ðə kætskɪ̣l mawntn̩z| ðɛrːæn ðə sɪlvɝ̣ hʌdsən æt ə dɪstənts| ðɛr wəz ɛvrɪ̣ hɪl æ̣n dejl prịsɑjslɪ̣ æ̣ż ɪt hæ̣d bɪn| rɪp wəz sowrlɪ̣ pɝplɛkst| ðæt flægən læst nɑjt| θɔt hi| hæz ædɪ̣d mɑj pʊr hɛd sædlɪ̣|| ɪt wəz wɪθ sʌm dɪfɪ̣kʌltɪ̣ ðẹt hị fawnd ðə wej tʊ̣ ɪ̣z own haws| hwɪtʃ hị əprowtʃt wɪθ sɑjlənt ɔ| ɪkspɛktɪ̣ŋ ɛvrɪ̣ mɪnət tʊ̣ hɪr ðə ʃrɪl vɔjs əv dejm væn wɪŋkəl|| hi fawnd ðə haws gɔn tụ dịkej| ðə ruf fɔlən ɪn| ðə wɪndowz ʃætɝ̣d| æ̣n ðə dowrz ɔf ðə hɪndʒəz|| ə hæf stɑrvd dɔg ðæt lʊkt lajk wʊlf wəz skʌlkɪ̣ŋ əbawt ɪ̣t|| rɪp kɔld ɪ̣m bɑj nejm| bət ðə kɝ snɑrld| ʃowd hɪ̣s tiθ| æn pæst ɔn|| ðɪs wəz æ̣n ʌnkɑjnd kʌt ɪ̣ndid| mɑj vɛrɪ̣ dɔg| sɑjd pʊr rɪp| hæz fɔrgɑtṇ mi||

31. This subject, aged 28, was born in Copenhagen, Denmark, and migrated to America at the age of 16. He learned a little English in Denmark and studied English for four years in a night school in this country. His parents are farmers; he is a carpenter by trade. (Note: *Abandoned* and *incomprehensible* were apparently not in this subject's vocabulary.

hi ɛntɜ̣d ðə hɑws wɪt͡ʃ tu tɛl ðə ṯruṯ dejm væn ỵɪŋkḷ hæd ɔly̥əz kɛpt ɪ̣nːit ɔdʒ̣|| ɪt f̬ʌz ɛmtɪ̣| fɔłbən ænd æ̣pæᴚəntlɪ̣ æbdɔm (abandoned)|| ðɪs dɛsolejtnɪ̣s ovɜ̣kejm ɔł hɪ̣s kạnʌbɪ̣əł fɪrs| hi kɔłd łɑwdlị fɔr hɪz wɑjf ænd t͡ʃɪldrẹn| ði łownlị t͡ʃejmbɜ̣s| Ræŋ fɔə ə mowmṇt wɪð hɪz vɔjs| æn ɔł əgɛn wʌz sɑjlɛns|| hi nɑw hʌrɪ̣d fɔrṯ| ænd hejsnɪ̣t tu hɪz owld rɪsɔrt| ðɪ vɪlɪ̣d͡ʒ ɪn| bʌt ɪt tu wʌz gɔən|| e lɑːd͡ʒ| ᴚɪkɪdị wʊdṇ bɪłdɪ̣ŋ stʊd ɪn ɪ͡ts plejs| wɪdð gᴚejt gæpɪ̣ŋ wɪndows| sʌm əv ðɛm brokɛn æ̣nd mɛndɪ̣d wɪð owłd hæ͡ts ænd pɛtịkow͡ts ænd ovɜ̣ ðɪ̣ dɔr pejntɪ̣d| ðɪ junjən hotɛł| bɑj d͡ʒonəṯɪn dolɪ̣ṯḷ|| ɪns͡tẹd əv ðə gᴚejt ṯᴚi dæt jus͡t tu ʃɛltɜ̣ ðə kwɑjt lɪtḷ dʌt͡ʃ ɪn əv jɔr| ðɛr wʌz nɑw ᴚɪrd ə tɔł| nejkəd poł wɪð sʌmṯɪŋ ɑn ðə tɑp ðæt łʊkd‿lajk ẹ ᴚɛd nɑjtkɑp| æ̣nd fᴚɒm ɪt wʌz flʌtəᴚɪ̣ŋ ə flæg| ɒn wɪt͡ʃ wʌz ə sɪŋjułə əsɛmblɛd͡ʒ əv s͡tɑrz ṇd s͡tᴚɑjps| ɔl ḏ͡ðɪs wəz s͡ṯrejnd͡ʒ æ̣nd ɪ̣nkɒ̣mhɛnsɪ̣bḷ (incomprehensible)||

32. This subject, aged 50, was born in East Prussia, Germany. At the age of 18 he left home to study in Leipzig, Berlin, and Halle successively. He then returned home for a stay of nine years, after which he spent 18 years in Berlin. He came to America about a year before this transcription was made and followed a program of speech improvement to develop his pronunciation of English, which he had first learned in Germany. He is a biologist, with considerable literary experience.

hi řɛcɒgnɑjz͡d ɒn ðɪ̣ sɑjn| hɑ̣wɛvɜ̣| ðə Rɑbi (ruby) fes ɒv cɪŋ d͡ʒɒd͡ʒ| ʌndə wɪt͡ʃ hi hæd smokt so mɛnɪ̣ e pisfʊłpajp| bʌt ivn ḏ͡ðɪs wʌ˫s sɪŋgjułɛrlɪ̣ mɛtəmɔrfọs͡d|| ḏ͡ðɪ řɛt kot wʌs t͡ʃendʃt fɔr wʌn əf blu ænd bɑf| e sɔᴚd̨ wʌ˫s hɛlt ɪn ðə hænd ɪ̣ns͡tɛd ɔv ẹ sɛptɜ̣| ðə hɛd̨ wʌ˫z dɛkọrejṯɪd̨ wɪz ẹ kɒkt hæt| ænd ɑndɜ̣niθ wʌ˫s penṯɪd̨ ɪ̣n łɑːdʃ cɛᴚẹtɜ̣s| d͡ʒɛnərəł wɔʃɪɲtən|| ðɛr wɔz| æz juʒjʊɫ| ə kʀɑwd ə fok əbɑwt ðə dɔr| bʌt nɑn ðæt rɪp ricọlɛctịd|| ðə vɛɾị cɛЯẹctɜ̣ ɒf ðə pipʟ̣ simd t͡ʃejnd͡ʒd|| ðɛr wɔz ə bɪzị| bʌs͡tlịɲ| dịspjutejʃəʃ toən əbɑwt ɪt| ɪns͡tɛd ɒv ði əkɑs͡tɒmd flɛgṃ (phlegm) ænd dɹɑwzi d̠͡ðæŋkwɪlɪtị| hi lʊkḍ ɪn vejn fɔr ðɪ sejd͡ʒ nɪcləs y̥ɛdʒ̣|| wɪθ hɪz broəd fejs| dɑbʟ̣ t͡ʃɪn| ạnd fɛr ɫɔŋ pɑɪp| ʌtʒɪ̣ɲ kɫɑwd͡ʒ əy̥ tɔbæko smok ɪns͡tɛd ɔv ɑjdʟ̣ spit͡ʃɪ̣z| ɔr van břʌmɛl| ðɪ skuːɫmastɜ̣| dowlịɲ fɔəθ ðɪ̣ kɒntɛnt͡s ɒv æn ejnʃịnt njuzpejpɜ̣||

33. This subject, aged 35, was born in Champaign, France. He remained there until he reached university age, at which time he moved to Paris. He came to America in 1929 and became a teacher of French at the University of Wisconsin.

ɪ̣n plejs əv ðiz| ẹ liən| bịljʌs ɫʊkịɲ fɛlọw wæz əʁæ̃ɲịɲ vəhẹmɛntlɪ̣ əbɑwt ʁɑjt͡s ɒv sɪtịzɛnz| ịlɛkʃʌnz| bæ̃ɲkɜ̣zɪl| (Bunker's Hill) ejʁọws (heroes) əv sẹvɛntịsɪks| æ̃nd ɑðɜ̣ wɛrdz| wit͡ʃ wɛr e pɜ̣fɛkt bɛbịlɒnɪ̣ʃ ʒɑʁgɒ̃n tu ðɪ̣ bịwɪldɜ̣d væn wɪɲkʟ̣|| ðị æpɪræ̃ns əv ʁɪp| wið ɪz ɫɑ̃ŋ gʁizɪ̣d bɪʁd| iz rʌs͡tị fɑwlịɲ pis| iz ɑ̃ŋkus (uncouth) dʁɛs| æ̃nd ən ɑʁmị əv wɪmæ̃n and t͡ʃɪldæ̃n ɛt is ˀilz| syn ạtɾæktịd ði ətæ̃nʃən əv ðɪ̣ tævʁn pɑlịtɪʃṇz|| ðej krɑwdịd əʁɑwnd hɪm| ejịɲ hɪm fʁɒm hɛd tu fʊt wið gʁejt cyʁɪ̣jʌzɪtẹj|| ði ɑʁətɜ̣ byslɛd (bustled) yp tu him| æ̃nd| dɹɔwịɲ him pɑʁtlɪ̣ əsɑjd| ɛnkwɑjɜ̣d ʊ̣n wit͡ʃ sɑjd i votịd|| ʁip s͡tejʁd in vejkṇt stʊ̣pɪdịtị|| ənɑðɜ̣ ʃoːt byt byzị litʟ̣ fɛjlow pyld ɪm bɑj ði ɑːm| æ̃nd| rɑjzɪɲ ʊ̣n tiptow| ịnkwɑjɜ̣d ɪn iz ɪr| wɛðɜ̣ i wɒz fɛd̠rəl ɔr dejmokræ̃t||

34. This subject, aged 34, was born in Andalusia, Spain. He was educated in Spanish schools, finishing at the University of Granada, Madrid. He came to America at the age of 23 and lived in the East for one year before going to the University of Wisconsin, where he is at present an instructor in Spanish.

rɪp wɔz ịkwɔlị at ə ɫɔ̣s tu kɒmprịhɛnd θi kwạst͡ʃɔn| ħwɛn ẹ nowịɲ| sẹlf ịmpɔrtạnt owɫd d͡ʒẹntẹlmɛn in ẹ ʃɑrp kɒkt hæt| mejd hiz wej θru θi krɑwd| putịɲ θɛm tu ʁɑjt ṇ lɛ$^{\mathrm{I}}$ft wiθ hiz albọws ạs hị pas͡t| and plantịɲ hịmsɑɫf bifɔr βan ħwɪɲcʟ̣| wɪθ wɔn ɑrm ɑkịmbo| ði ɔðɜ̣ rɛstɪɲ ɒn his cejn| his cin ɑjs ṇd ʃɑʁp hat pẹnịtrejtịɲ| as ịt wɛr| ɪntu hɪs vɛɾị sowɫ| dịmandịd ɪn an owstịr town| ħwɒt bʁɔt him tu ði ilɛcʃən wɪθ e gɑn ɒn his ʃọwldɜ| and ẹ mɒb æt hịz hɪlz ænd ħwɛðẹ hi mɛn tu bʁid̠͡ð ə ʁɑjot ɪn ði vɪlịʒ|| ɑlạs| d͡ʒɛntịmɛn| krɑjd rɪp| ɑːm ẹ pʊwə kwɑɪt man| e netiv əv ðɪs plejs| an ə ɫɔjəɫ sʌbd͡ʒɛk əv ðị cɪɲ| gɒd blɛs hɪm‖ hiə ẹ d͡ʒɛnẹrɑ̣l ʃɑwt bɜs͡t fʁɒm ði bɑ̣js͡tɛndʒ̣z| ɛ̣ tɔɾɪ̣| ɛ̣ tɔɾɪ̣| ẹ spɑj| ɛ̣ ʁɛ̣fjụd͡ʒi| hʌsɪ̣ him| ẹwej wiθ him‖

35. This subject, aged 30, was born in Claude, Texas. He has lived there all his life except for four years as a college student in Canyon, Texas; four years as a high school principal in Friona, Texas; three and a half years as a student in speech at Northwestern University, a summer of travel in Europe and four years as a teacher of speech in the Junior College at Amarillo, Texas. He is at present working on his Ph.D. at Louisiana State University.

ɪt wɑz wɪð grejt dɪfəkʌltɪ̣ ðæt ðə sɛlf ɪmpɔrtənt mæn ɪ̣n ðə kɑkt hæt rɪ̣stowrd ɔrdɝ̣| æ̣n hævɪ̣ŋ ẹsjumd ə tɛnfowld ɔstɪrɪ̣tɪ̣ əv brɑw| dɪ̣mændɪ̣d əgɛn əv ðə ənfɔrtʃənːɪ̣t kʌlprɪ̣t| hwɑt hɪ̣ kejm fɔr æ̣n hum hɪ̣ wəz sikɪ̣ŋ‖ ðə powr mæn hʌ˫mblɪ̣ æ̣ʃʊrd hɪm ðæ̣t hɪ̣ mɛnt now hɑrm| bət mɪrlɪ̣ kejm ðɛr ɪ̣n sɝtʃ əv sʌm əv hɪz nejbɝ̣z hu justːu kip əbawt ðə tævɝ̣n‖ wɛl hu ɑr ðej‖ nejm ðəm‖ rɪp bɪ̣θɔt hɪ̣msɛlf ə mowmənt æ̣n ɪŋkwɑjrd| hwɛrz nɪkələs vɛdɝ̣‖ ðɛr wəz sɑjlənts fɔ̣r ə lɪtɪ̣ hwɑjl| hwɛn æ̣n owld mæn rɪ̣plɑjd ɪn ə θɪn pɑjpɪ̣ŋ vɔjs| nɪkələs vɛdɝ̣| wɑj hiz dɛd ṇ gɔn ðiz ejtːin jɪrz‖ ðɛr wəz ə wʊdṇ tumstown ɪ̣n ðə tʃɝtʃjɑrd ðət justːụ tɛl ɔl əbɑwt ɪ̣m| bət ðæ̣ts rɑtṇ ṇ gɔn tu‖ hwɛrz brɑm dʌtʃɝ̣‖ ow hi wɛnt ɔf ət ðə bəgɪnɪ̣ŋ əv ðə wɔr| sʌm sej hɪ̣ wəz kɪld æ̣t ðə stɔrmɪ̣ŋ əv stownɪ̣ pɔjnt| ʌðɝ̣z sej ị wəz drɑwnd ṇ ə skwɔl æ̣t ðə fʊt əv æntənɪ̣z nowz‖ ɑj downt now| hi nɛvɝ̣ kejm bæk əgæn‖

36. This subject, aged 20, was born and reared in North Louisiana, where she has lived all her life. Her parents were both natives of that section. She is at present a Junior at Louisiana State University.

hwɛəz væn bjumɛl| ðə skʊlmæstə‖ hi wɛnt ɔf tụ ðə wɔːz tu| wɔ̣z ə grejt məlɪʃə gɛnrəl| æn ɪz næw ɪn kɑngrəs‖ rɪps hɑːt dɑəd əwej ət hɪrɪ̣ŋ əv ðiz sæd tʃejndʒəz ɪn hɪ̣z howm æ̣n frɛnz| æn fɑjnɪ̣ŋ hɪmsɛᵊf ðʌs əlown ɪn ðə wɝld‖ ɛvər ænsə pʌzɪ̣d hɪ̣m tu| bɑ̣ tritɪ̣ŋ əv sʌtʃ ịnɔrməs læpsɪ̣s əv tɑᵊm| æ̣n əv mætəz hwɪtʃ hɪ̣ kʊd nɑt ʌndəstænd| wɔr| kɑngrəs| stownɪ̣ pɔjnt| hɪ̣ hæd now kɝɪ̣dʒ tụ æsk æftə moʊr əf ɪ̣z frɛnz| bʌt krɑᵊd ɑwt ɪn dɪ̣spɛr| dʌz nowbɑdɪ̣ hɪr now rɪp væn wɪŋkɪ̣‖ ow rɪp væn wɪnkɪ̣| ɛksklejmd tu ɔ̣r θri| ow tụ bi ʃʊr| ðæ̣ts rɪp væn wɪŋkɪ̣ jɑndə| linɪ̣ŋ əgænst ðə tri‖ rɪp lʊkt æ̣n bɪ̣hɛld ẹj prɪ̣sɑᵊs kæwntəpɔᵀɪt əv hɪ̣msɛlf æz ị wɛnt ʌp ðə mæwntṇ| əpɛrənʔlɪ̣ æ̣z lejzɪ̣ æ̣n sɝtənlɪ̣ æ̣z rægəd‖

37. This subject, aged 60, was born and reared in middle Scotland,

Aberdour (Fifeshire). Her father was a teamster from Glasgow. She worked in a mill while in Scotland. She came to America at the age of 28, married and set up housekeeping in Madison, Wisconsiṇ, where she still lives.

ðə puər fɛlọw waz nɛow kɒ̣mplitlɪ̣ kɒ̣nfɛwndɪ̣d|| hi dɛwtɪ̣d hɪz ɛown ajdantɪ̣tɪ̣| and ħwɛðɜ̣ hi wɒz hɪ̣msɛlf ɔř ɛ̣nɒðɜ̣ man|| ɛ̣n ðɪ̣ mɪds͡t ɒv hɪz bɪ̣wɪldɜ̣mənt| ðə man ɪn ðɪ kɒkɪ̣d hat dɪ̣mændɪ̣d hu hɪ̣ wɒz and ħwɒt wɒz hɪ̣z nejm|| gɒd nɛwz| ɛksklejmd hi| at hɪz wɪt͡s and| ɑjm nɒt majsɛlf| ɑjm sʌ̣mbɒdɪ̣ ɛ̣ls| ðat͡s mi jɒndɜ̣| nɛw| ðat͡s sʌmbʌdɪ̣ ɛls gɒt ɪntʊ̣ mɑj ʃuz| ɑj wɒz mɑjsɛlf las͡t nɛjt ħwɛn aj fɛl əslip ɒ̣n ðɪ̣ mawntɪ̣n| and ðejv t͡ʃejnd͡ʒd mai gɑn| and ɛvřɪðɪŋz̥ t͡ʃejnd͡ʒd| and ɛjm t͡ʃejnd͡ʒd| and ɑj kɑntɛl ħwɒts maj nɛjm| ɔ̣r hu aj æm|| ðə bajs͡tandɜ̣z bigan nɛw tʊ̣ luk at it͡ʃ ʌðɜ̣| nɒd| wɪnc sɪɟnɪfɪ̣cɪ̣ntlɪ̣| and tɛpt ðejə fɪŋgɜ̣s ạgejns͡t ðɛjə fowhɛds|| ðɪjɝ̣ wɒz ɛ̣ ħwɪspɜ̣| ɔłsọ| ɛbɛwt sɪcjurɪ̣ɲ ðɪ gɑn| and cipɪ̣n ðɪ owld fɛlə frɒm duɪ̣ɲ mɪstʃɪ̣f| at ðə vɛɾɪ̣ səd͡ʒɛst͡ʃən ɒ̣v ħwɪt͡ʃ ðɪs:ɛlf ɪmpɔɾtṇt man ɪn ðɪ kɒkɪ̣d hat ritɑjəd wɪð səm pɾisɪ̣pɪ̣tejʃən||

38. This subject, aged 55, was born in Lithuania in the Province of Kovno. He came to America at the age of 18 and settled in Chicago, where he first learned English. His first language was Judeo-German (Yiddish), the influence of which is shown in this sample. It should be noted that most of the *t*'s and *d*'s are slightly dental, though not enough so to indicate them as (t̪) and (d̪). The (s) and (ʃ) apparently fall into one phoneme, the focus of which is about halfway between the two.

æ̣˔ɪt͡ðɪs kɾɪtɪ̣kæ̣ł mowmẹnt ẹ fřɛʃ kɑmlɪ̣ wʊmən přɛst͡ðɹu di d͡ðɹɔ˧ŋ tu gɛt ẹ pi˕p ɛ˕t d̠i gřej bɪřdẹd̥ mæ˕n|| ʃi˹ hæ˔d̥ ẹ t͡ʃɔ˧b̥i˕ t͡ʃɑjld̥ i˕n hʌř ɑřəms| βɪ˔t͡ʃ| fřɑjtṇt bɑj hɪ˔z̥ lʊks| bigejn tu křɑj|| hɔ˧ʃ řɪ˔p| křɑjd̥ ʃi| hʌʃ ju lɪ˔dɪ̥ fʊ̠ł| d͡ði ɔwłd mɛ˔n βʌnt hɜt͡ʃụ|| d͡ði nejm əv̥ ðɪ̣ t͡ʃɑjld̥| ðɪ̣ ɛ˕ř əv̥ d͡ðɪ̣ mʌd͡ðɜ̣ř| ði tʊən əv̥ hʌr βɔjs| ɔł ɛβejkṇd̥ ej tɹejn ov̥ řikɔ̣lɛkʃʌns ɪ˔n hi˕z̥ mɑjnd̥|| βɑ̣t ɪz̥ jʊř nejm| mɑj gʊd βʊmṇ| æ˔skt hi| d̠ʒʊd̠ɪ̣t̠ gɑřdṇř| æ˔nd jʊř fɑd̠əřs nejm| ɑ puř mæ˔n| řip βæn βi˕ɲkɪ̥ βʌz hiz nejm| bʌt̠ ɛt̠ ɪz̥ tβɛntɪ̣ jɪřs sɪns hi βɛnt eβej βɪt hɪz gʌ˕n| æ˔nd̥ hæ˔z nɛvɜ̣ř bɪn hɛřd̥ əv sɪns| hi˕z dɔ˧g kejm hom βɪd̠ɑwt̠ hɪm| bʌt βɛdɜř hi ʃɑt hɪ˔msɛlf ɔř βɔz kɛřɪd̠ ɛβej bɑj di ɪndɪ̣ənz| nowbɑ˔di kɛn tɛl|| ɑj βɒz dɛn bʌt̠ ej lɪdɪ̥ gʌřəł.

39. This subject, aged about 30, was born in Costa Rica. He came to the United States a year and a half ago. He neither spoke nor under-

stood English when he came to this country. He is at present a student at Louisiana State University and has had some training in the University Speech Clinic.

rɪp hæḍ bʌt wʌn mowr kwɛstʃən t̪ʊ̣ æsk| bət hɪ̣ pʊt ɪ̣t ɪn ə fɑðɝɪ̣ŋ (faltering) vɔjs| hwɛrz joʊr mʌd̪ə| o ʃi t̪ʊ̣ hɑd dɑjd b̥ʌt ẹ tʃɔrt t̪ɑjm sɪnts| ʃi browk ẹj blʌd vɛsəl ɪn ẹj fit əv pejʃən æt ẹj nju ɪŋglæ̣nd pɛdəlɚ̣|| ðɛr wɑs ej drɑp əv kɑmfọrt æt list| ɪn ðɪs ɪntɛlədʒənts|| ðị hɑnẹst man kʊd kənt̪ejn hɪmsɛlf now lɔŋgɚ̣| hi kɒt hɪz̥ dɔtɚ̣ æn hɝ tʃɑld ɪn hị̣s ɑrms|| ɑj æm jʊr fɑðɝ| krɑjd hi| juŋ rip væn wɪŋkəl wʌnts| old rip væn wɪŋkəl nɑw|| dʌz̥ nowbɑdị now por rip væn wɪŋkəl|| ɔl stʊd æ̣mejzd| ʌntɪl æ̣n owld wʊmən| t̪ɒt̪ɝɪ̣ŋ ɑwt frəm æ̣mʌŋ ðə krɑwd| pʊt hɚ̣ hænd tʊ̣ hɚ̣ bro æ̣n pɪrɪ̣ŋ ʌnɚ̣ ị̣t æt hɪs fejs for ẹj mowmənt| ɛksklejmd| ʃowr enʌf| ɪt ɪ̣z̥ rɪp væn wɪŋkəl| ɪt ɪ̣z̥ hɪ̣msɛlf|| wɛlkəm howm ẹgɛn ol nejbɚ̣|| hwɑj hwɛr hav ju bɪn d̪ɪs t̪wɛnt̪ɪ̣ lɔŋ jɪrs||

40. This subject, aged 20, was born in Utica, New York. His parents were both natives of that section. He has lived in that section of New York State all of his life except for the last three years, during which time he has been a student at Louisiana State University. He is an undergraduate speech major. He has traveled a little in the East.

rɪps storɪ̣ wəz sun towld fɚ̣ ðə howl twɛntɪ̣ jɪrz hæd bɛn tʊ̣ hɪ̣m æz bət wʌn nɑjt|| ðə nejbɚ̣z stɛrd hwɛn ðej hɝd ɪ̣t| sʌm wɝ sin tʊ̣ wɪŋk ət itʃ ʌðɚ̣ æ̣n pʊt ðɛr tʌngz ɪ̣n ðɛr tʃiks| ṇ ðə sɛlf ɪ̣mpɔrtənt mæn ɪ̣n ðə kɑkt hæt| hu| hwən ðə əlɑrm wəz owvɚ̣| hæ̣d rị̣tɝnd tʊ̣ ðə fild| skrud dɑwn ðə kɔrnɚ̣ əv ɪ̣z mɑwθ æ̣n ʃuk ɪ̣z hɛd| əpɑn hwɪtʃ ðɛr wəz ə dʒɛnɚ̣əl ʃejkɪ̣ŋ əv hɛdz θruɑwt ðị əsɛmblɪ̣dʒ|| ɪt wəz dị̣tɝmənd hɑwɛvɚ̣ tʊ̣ tejk ðị opɪnjən əv owl pitɚ̣ vændɚ̣dɔŋk| hu wəz sin slowlɪ̣ æ̣dvænsɪ̣ŋ əp ðə rowd|| hi wəz ə dị̣sɛndənt əv ðə hɪstorị̣ən əv ðæt nejm| hu rowt wʌn əv ðị ɝlị̣ɪst æ̣kɑwnts əv ðə prɑvənts|| pitɚ̣ wəz ðə mowst ejntʃənt ɪnhæbətənt əv ðə vɪlədʒ| æn wɛl vɝst ɪ̣n ɔl əv ðə wʌndɚ̣fʊ̣l ị̣vɛnts ṇ trədɪʃənz əv ðə nejbɚ̣hʊd||

41. This subject, aged 22, was born in Genoa, Illinois. His parents are both natives of that state. His college work was done at DePauw University in Indiana, where he majored in speech. He is at present a graduate student in speech at Louisiana State University.

hi rɛkəlɛktị̣d rɪp æ̣t wʌnts| ən kɔ̣rɑbọrejtị̣d hɪz storɪ̣ ɪ̣n ðə mowst sætị̣sfæktɝɪ̣ mænɚ̣|| hị əʃord ðə kʌmpənɪ̣ ðæ̣t ɪt wəz ə fækt| hændị̣d dɑwn frəm ɪ̣z ænsɛstɚ̣| ðə hị̣storị̣ən| ðæ̣t ðə kætskɪl mɑwntṇz hæ̣d ɔlwịz bɪn hɔntəd bɑj strejndʒ biịŋz‖ ðæt ɪt wəz əfɝmd ðət ðə grejt hɛnrịk hʌdsən| ðə fɝst dịskʌvərɚ̣ əv ðə rɪvɚ̣ æ̣n kʌntrị| kɛpt ə kɑjnd əv vɪdʒəl ðɛr ɛvrị twɛntị jɪrz wɪθ hịz kru əv ðə hæf mun| biịŋ pɚ̣mɪtịd ịnɪs (in this) wej tụ rivɪsịt ðə sin əv hɪz ɛntɚ̣prɑjz| æ̣n kip ə gɑrdịən ɑj əpʌn ðə rɪvɚ̣| æ̣n ðə grejt sɪtị kɔld bɑj ịz nejm‖ ðæ̣t hɪz fɑðɚ̣ həd wʌnts sin ðɛm ịn ðɛr owld dʌtʃ drɛsịs plejịŋ æ̣t nɑjn pɪnz ịn ə hɑlow əv ðə mɑwntṇz| ən ðæ̣t hi hịmsɛlf hæ̣d hɝd| wʌn sʌmɚ̣ æftɚ̣nun| ðə sɑwnd əv ðɛr bɔlz lɑjk dɪstənt pilz əv ðʌndɚ̣‖

42. This subject, aged about 22, was born and reared in New Orleans. His parents were both native of New Orleans. His father runs a restaurant. The subject has traveled very little. He is at present a student at Louisiana State University.

tʊ̣ mejk ə lɔŋ storị ʃɔːt| ðə kʌmənị browk ʌp| æ̣n rịtɜnd tʊ̣ ðə mour ịmpɔːtənt kənsɜɪnz əv ðə ịlɛkʃənz‖ rɪps dɒtə tʊk hịm howm tʊ̣ lɪv wɪθ hɜ| ʃi hæd ə snʌg wɛl fɜnịʃt hɑws| æ̣n ə stɑwt tʃɪrị fɔːmə fɔr ə hʌzbənd| hum rɪp rɛkəlɛktịd fɔ̣ wʌn əv ðə ʌɪtʃịnz ðæ̣t justːụ klɑjm əpɔn ịz bæk‖ æz tʊ̣ rɪps sʌn æ̣n ɛr| hị wəz ɪmplɔjd tʊ̣ wʌɪk əpɔn ðə fɑːm| bət ịvɪntst ən hərɛdịtɛrị dɪspọzɪʃən tʊ̣ æ̣tɛn tụ ɛnịθɪŋ ɛls bʌt ịz bịznəs‖ rɪp nɑw rịsumd ịz owl wɔks ṇ hæbịts| hị sun fɑwn mɛnị əv ịz fɔːmɚ̣ krownịz| θow ɔl ræðɚ̣ ðə wɜɪs fɔ̣ ðə wɛr æ̣n tɛr əv tɑjm| æ̣n pəfʌd mejkən frɛnz əmʌŋ də rɑjzịŋ dʒɛnɚ̣ejʃəns| wɪθ hum hi sun gru ɪntụ grejt fejvə‖ hævịŋ nʌθịŋ tʊ̣ du æ̣t howm| æ̣n biịŋ əːɑjvd æ̣t ðæt hæpị ejdʒ hwɛn ə mæn kẹn bi ɑjdḷ wɪθ ɪmpɪụnị (impunity) hi tʊk hịz plejs wʌnts moʊr æ̣t ðə bɛntʃ æ̣t ðə ɪn dowr| æ̣n wəz rɛvɚ̣əns æ̣z wʌn əv ðə pejtrɪəts (patriarchs) əv ðə vɪlədʒ| æ̣n ə krɑnəkəl əv ðə owl tɑjms bəfowə ðə wɔr‖

43. This subject, aged 49, was born in the foothills of the Italian Alps. She was educated through the third grade (about grade 4-A in the American school system.) Her teacher was from her own village but insisted on using the "pure Italian" in the schoolroom. She came to this country and married an Italian immigrant who had been born in a small village "about an hour's walk" from hers, but whose native dialect was different. There is some German influence through contact with the language in a hotel where she worked for five years. She is a housewife and also "does washings."

it wəz⁀səm tɑjẹm bịfor hi kyɪn (could) gɛt⁀intə d̪ə rɛgụlɑr traç ɒv gɑsịp| or ko^{T}d̪ bi mejd t̪ʊ̣ komˈprɛnd ð̪ə strɛndʒ æ̣vɑnts ð̪æ̣t hẹd tejkən plejs dɝɪ̣ŋ hiz tɝpɚ̣‖ hɑuː ð̪æt d̪ɛr əz (had) bin ə rævọlʊ̣ˀt͡ʃˈnɛri wɒr| ð̪æt ð̪ə kɒntrị hɛd trown of d̪ə d̪jok ɒf ol ɪŋlən| æn d̪at ịnstɛ$^{\perp}$d əv biŋ ə səb'd͡ʒɛk ɒv hiz 'mæjəsti d͡ʒɑɝ̣d͡ʒ d̪ə tɝd| hi wəz nɑuː ə fri sitəzən əv ð̪ə ụnɑjtəd stejt|| ɹɪ$^{\perp}$p ɛn fæ$^{\perp}$k wəz njo pɑ̣lə'tɪ$^{\perp}$ʃən| d̪ə t͡ʃɛ$^{\mathrm{T}}$nd͡ʒ ịn stɛjt ən ịm'pajrz mɛ$^{\mathrm{T}}$d bət litḷ ị$^{\perp}$mprɛʃən ɒn hị$^{\perp}$m| bat d̪ɛr wəz won spɑjsəz (species) əf dị$^{\perp}$spə'tism əndɛr wit͡ʃ hi hæ̣d kɹonẹt (groaned)| æn d̪ɑt wəz pɛtịkọt gʌvɜnəmənt|| hæplị d̪at wəs æt ən ænt| hi hɛd gɑt his nɛk ɑuːt ɒv d̪ə d̪jok ɒv mætrịmonị| æn kyːn (could) gọ in æn ɑuːt hwɛne$^{\mathrm{T}}$vɝ hi plisəd wɪd̪ɑuːt d̪ɹejdịŋ d̪ə trænị (tyranny) ɒv dɛm vɛn wɪnkḷ|| hwɛne$^{\mathrm{T}}$vɝ hɝ nejm wəz mæntjụnɛt| họejvɝ| hị ʃok hịs hạd| ʃrugɛd hịz ʃoldẹr æ̣n kɑst ˀɑ$^{\perp}$p ɪz ɑjəz wịt͡ʃ mɑjt pæs id̪ɝ for ən⁀ẹsprɛʃən ɔf rạsịnejʃən ta his fejt ọr t͡ʃɔj⁀æ̣t his dəlivɝæns||

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